United States Department of Agriculture

Forest Service

White Mountain National Forest
Androscoggin and Evans Notch Ranger Districts

300 Glen Road
Gorham, NH 03581-1399
Comm (603) 466-2713
TTD (603) 466-2856

File Code: 1950

Date: January 27, 2005

Dear Interested Citizen:

The Androscoggin Ranger District of the White Mountain National Forest is preparing an Environmental Assessment (EA) for the Connor Brook Project and would like your comments regarding the project. This EA is substantially completed, and no decision has been made. We are proposing Alternative 2 (Modified Proposed Action) which includes the following management activities: (1) Timber harvest approximately 2.02 million board feet on 521 acres of National Forest land, utilizing both even-aged and uneven-aged management techniques; (2) perform restoration maintenance on 2.1 miles of existing Forest Service roads and re-establish 4 log landings; (3) widen the Connor Brook Road to provide for long-term winter dual use (snowmobile and vehicle) traffic and: (4) carry out a prescribed burn on 29 acres to perpetuate an existing Oak community.

The opportunity to comment on the EA ends 30 calender days following the publication of a legal notice in the Manchester Union Leader. If you do not have access to this paper, please call the Androscoggin Ranger Station at 603-466-2713 (TTY 603-466-2856) for the published date. You can obtain copies of the EA at the Androscoggin Ranger Station and on the White Mountain National Forest web site at **www.fs.fed.us/r9/white**.

Please note that new regulations are in effect which allow only those who submit ***timely and substantive*** comments to be accepted as appellants. A substantive comment is defined as a comment that is within the scope of the proposed action, is specific to the proposed action, and has a direct relationship to the proposed action (36 CFR 215.2). Substantive comments will be used to refine issues, environmental effects, and alternatives.

Individuals and organizations wishing to be eligible to appeal must provide the following information: (1) Name, address and telephone number; (2) Title of the proposed action; (3) Specific substantive comments on the proposed action, along with supporting reasons the Responsible Official should consider in reaching a decision; and (4) Signature or other verification of identity upon request.

Comments should be directed to the Androscoggin Ranger District, Katherine Stuart via:

- Letter (300 Glen Road, Gorham, NH 03581). Office business hours for those submitting hand delivered letters are Monday through Saturday 8:00am to 4:30pm;
- Phone (603-466-2371 ext. 210);
- FAX (603-466- 2856); or
- E-mail (**comments-eastern-white-mountain@androscoggin@fs.fed.us**). Electric comments should be submitted in plain text(.txt), rich text format(.rft) or Word (.doc) format.

Please be aware that your name, address and comments will become part of the public record and may be available for public inspection. If this is a concern, please contact us at your earliest convenience.

Thank you for taking the time to participate in this process and providing me with your thoughts. If you have any questions please contact Pat Nasta at 603-466-2713, ext. 222. I look forward to hearing from you.

Sincerely,

Katherine Stuart
District Ranger

United States
Department of
Agriculture

Forest
Service

January 2005

CONNOR BROOK VEGETATION MANAGEMENT PROJECT

Town of Shelburne
Coos County, New Hampshire

Environmental Assessment

Prepared By
Androscoggin Ranger District,
White Mountain National Forest

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Contact the White Mountain National Forest Supervisor's Office

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Connor Brook Vegetation Management Project EA Summary

The Androscoggin Ranger District of the White Mountain National Forest is proposing the following management activities for the Connor Brook Project (Alternative 2):

- Timber harvest of approximately 2.02 million board feet on 521 acres of National Forest land within Habitat Management Unit (HMU) 215, utilizing both even-aged and uneven-aged management techniques;
- Perform restoration maintenance on 2.1 miles of existing Forest Service Road 95 and re-establish 4 log landings.
- Carry out a prescribed burn on 29 acres to promote, enhance or maintain the existing Oak community. This activity was not addressed in the scoping letter released in June 2004 due to an omission.
- Widen the Connor Brook Road to provide for long-term winter dual use of snowmobiles and vehicle traffic.

The prescribed burn and road widening above are actually a modification of the original Proposed Action, which had been presented to the public for comment in June 2004. These changes from the original that are proposed in this "Modified Proposed Action," Alternative 2, are in response to comments received during the scoping process, as well as new information from updated field inventories and internal review.

The **Analysis Area** for the Connor Brook Project is HMU 215 and encompasses 4,952 acres of National Forest land. Of this, approximately 3,428 acres are within Management Area designation 3.1 which prescribes vegetation management to achieve the goals and objectives of the White Mountain National Forest Land and Resource Management Plan (LRMP, 1986). The **Project Area** is the portion of the Analysis Area that includes stands proposed for vegetative management, as well as the area associated with connected actions (roads and landings). For the Modified Proposed Action (Alternative 2) it is 521 acres of National Forest lands proposed for harvest located in the town of Shelburne, Coos County, New Hampshire, on the Androscoggin Ranger District of the White Mountain National Forest.

An Interdisciplinary Team (IDT) of Forest Service resource specialists chose the initial treatment areas as a result of an analysis of the existing habitat conditions within HMU 215 **(Purpose for the action)**. Comparing the existing conditions to the desired conditions outlined in the Forest Plan, the IDT identified a need to increase age class and habitat diversity, enhance softwood production on appropriate sites, improve stand conditions for optimum tree growth, and provide quality wood products **(Need for the action)**.

In addition to the Modified Proposed Action (Alternative 2) described above, the IDT considered alternative proposals for addressing the Purpose and Need for this project. Two of these alternatives were developed and analyzed in detail, including Alternative 1, the "No Action" alternative; and Alternative 3, the Excluded Roadless Action. The proposed activities for each of these alternatives are summarized in Table A and a more detailed description and analysis of effects for each alternative is included in Chapters 2 and 3 of this Environmental Assessment.

Table A. Activities Proposed for Connor Brook Project, By Alternative

Proposed Activity	Alt 1	Alt 2	Alt 3
Timber Harvest (Acres)			
Clearcut & Patchcut	**0**	**56**	**4**
Seed Tree Cut	**0**	**14**	**8**
Shelterwood Cut	**0**	**29**	**29**
Group Selection Cut	**0**	**156**	**94**
Individual Tree and Group Selection Cut	**0**	**266**	**161**
Transportation System (Miles)			
Miles of Road Restoration	**0**	**2.1**	**1.8**
Miles of Road Widening	**0**	**1.8**	**0**
Prescribed Burning (Acres)	**0***	**29**	**29**

* Prescribed Fire may be undertaken as a separate project

The Modified Proposed Action (Alternative 2) is the preferred alternative of the Forest Service. It would meet the Purpose and Need for this project while adequately addressing concerns about possible soil erosion and visual effects.

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CHAPTER ONE – INTRODUCTION

1.0 Introduction and Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into five parts:

- **Purpose and Need for Action:** The section includes information on the history of the project proposal, the purpose of and need for action, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

- **Comparison of Alternatives, including the Proposed Action:** This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public, the Forest Service and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

- **Environmental Consequences:** This section describes the environmental effects of implementing the proposed action and other alternatives and is organized by resource area. Within each section, the affected environment is first described, followed by the effects of the No Action Alternative (provides a baseline for evaluation and comparison of the other alternatives that follow) and then the effects of the proposed alternatives.

- **Agencies and Persons Consulted:** This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

- **Appendices:** The appendices provide more detailed information to support the analyses presented in the environmental assessment.

  Additional documentation, including more detailed analyses of project-area resources, may be found in the Project Planning Record located at the Androscoggin Ranger District Office in Gorham, New Hampshire.

1.1 Background

The Project Area is the National Forest land proposed for vegetative management located within the Town of Shelburne in Coos County, New Hampshire, on the Androscoggin Ranger District of the White Mountain National Forest (Appendix A, Map 1A). It has a history of vegetation and wildlife habitat management dating back to the late 1800's and continues to be actively managed today. Aside from timber harvest, the area offers a wide variety of recreation activities, including hiking, scenic and fall foliage viewing, camping, cross-country skiing, snowmobiling, mountain biking, snow-shoeing, wildlife watching, hunting, fishing, and cutting Christmas trees and firewood.

The Analysis Area is the larger National Forest management unit within which the Project Area is found. It consists of "Habitat Management Unit" (HMU) 215 and is approximately 4,952 acres in size. A Habitat Management Unit is described in detail in Appendix B of the 1986 White Mountain National Forest Land and Resource Management Plan (hereafter referred to as the Forest Plan).

HMU 215 encompasses 4,952 acres of National Forest land, of which 3,428 acres are allotted by the Forest Plan to Management Area 3.1, or lands considered suitable for timber harvest. The HMU includes the Shelburne hiking trail and one snowmobile trail, Corridor 19, which both utilize the Connor Brook Road. Map 1B in Appendix A shows the location of HMU 215 in Coos County.

1.1.1 White Mountain Land and Resource Management Plan – Final Environmental Impact Statement and Record of Decision, as Amended (USDA, 1986b, FEIS)

The White Mountain National Forest (WMNF) has prepared this Environmental Assessment (EA) in accordance with the White Mountain National Forest Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision, as Amended (USDA, 1986b, FEIS).

The Forest Plan is a programmatic document required by law that implements the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The purpose of the Forest Plan is to provide direction for multiple use management and sustained yield of goods and services from National Forest lands in an environmentally sound manner.

The Forest Plan sets management direction for the White Mountain National Forest through the establishment of short term (10-15 years) and long-term (through the year 2036) goals and objectives. It prescribes the standards, practices, and the approximate timing and vicinity necessary to achieve goals and objectives. The Forest Plan allocates National Forest lands to particular "Management Area" prescriptions, establishes monitoring and evaluation necessary to ensure that direction is being followed and is working as intended, measures quality and

quantity of actual operations against predicted outputs and effects, and forms the basis for implementing revisions.

In addition to allocating lands, the Forest Plan establishes a strategy to manage well-distributed and suitable wildlife habitat for maintaining viable populations of existing native and desired non-native vertebrate species. To provide the necessary habitat diversity for wildlife populations, the Forest Plan designated "Habitat Management Units" (HMUs) to distribute community types across the National Forest. Of the 780,000 acres comprising the White Mountain National Forest, approximately 345,000 acres are considered "suitable lands" where vegetative management is permitted through the use of commercial timber harvesting. These suitable lands are typically in lower elevations and include Management Areas 2.1 and 3.1, where timber harvest is utilized to maintain variety in wildlife habitat and to generate timber products. Each HMU contains an unspecified amount of non-managed lands (where no timber harvesting is allowed), and at least 4,000 acres of suitable lands in Management Areas 2.1 and/or 3.1. Non-managed lands may include Management Areas 6.1 and 6.2, where non-motorized recreation is emphasized and timber harvest is either limited to salvage operations (6.1) or not permitted at all (6.2). Non-managed lands comprise nearly 410,000 acres of the Forest, providing a significant amount of mature and overmature wildlife habitat.

The Desired Future Condition (DFC) of an HMU is intended to provide a variety of habitat types and age classes (together defined as community types) to meet the life cycle needs for the wildlife species that inhabit the National Forest (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001). Examples of habitat types include "northern hardwood", "spruce/fir", "paper birch" and "oak/pine". The age classes are based on stages of natural forest succession, ranging from the "regeneration" (0-9 years) phase of forest growth to the "overmature" (beyond the age when growth begins to decline) phase. Wildlife species that require or otherwise utilize "early-successional" vegetation will benefit from the availability of forest stands in the regeneration phase of growth. The same correlation is true for mature and overmature stands and those wildlife species that require or otherwise utilize "late-successional" vegetation. Early-successional vegetation is characterized most often by dense, ground level plant cover in areas open to direct sunlight. Late-successional vegetation is more typically characterized by large, mature woody vegetation with a closed canopy (foliage) that blocks sunlight from the ground. A more detailed explanation for how the distribution of habitat types and age classes determine where and when the White Mountain National Forest proposes to harvest timber can be found in Chapter 1.3.1 (Need for Change) and Chapter 3 (Section 3.2, Vegetation, and Section 3.9.1, Wildlife Habitat).

NFMA states that Forest Plans "shall be revised from time to time when the Secretary finds conditions in a unit have significantly changed, but at least every 15 years" (16 U.S.C. 1604(f)(5)). However, Congress did not intend management to cease if the 15-year target date for plan revision was not met. NFMA, Section 1604 (c) illustrates this point. In the development of the original forest plans, Congress specifically allowed management of the forests to continue under existing resource plans pending approval of the first NFMA forest plan for each administrative unit. Section 321 of the Fiscal year 2003 Interior Appropriations Act included language that allowed National Forests to continue managing. The language states "Prior to October 1, 2003, the Secretary of Agriculture shall not be considered to be in violation of subparagraph 6(f)(5)(A) of the Forest and Rangeland Renewable Resources

Planning Act of 1974 (16 U.S.C. 1604(f)(5)(A) solely because more than 15 years have passed without revision of the plan for a unit of the National Forest System."

A Notice of Intent to revise the Forest Plan was published February 14, 2000. The draft Environmental Impact Statement has been published and is out for review at this time, to be followed by a release of the Final Environmental Impact Statement some time in the summer/fall of 2005.

1.2 Purpose for the Action

The Purpose for this project is to accomplish resource objectives to meet the overall management direction for the White Mountain National Forest, as established in the Forest Plan (USDA 1986a. Forest Plan, III 30-41). Within the Project Area, the Forest Plan establishes the following goals for Management Area 3.1:

The goals for MA 3.1 are to:

- Provide large volumes of high quality hardwood sawtimber on a sustained yield basis and other timber products through intensive timber management practices,
- Increase wildlife habitat diversity for the full range of wildlife species with emphasis on early-successional species,
- Grow small diameter trees for fiber production
- Broaden the range of recreation options, mainly offering semi-primitive motorized experience opportunities.

1.3 Need for the Action

An Interdisciplinary Team (IDT) of Forest Service resource specialists chose the initial treatment areas because an analysis of HMU 215, comparing existing habitat conditions to desired conditions as outlined in the Forest Plan, indicated there is a Need to increase age class and habitat diversity (Forest Plan, VII-B-12/13), enhance softwood production on appropriate sites, improve stand conditions for optimum tree growth and provide quality wood products.

The Forest Plan allotted the 4,952 acres of National Forest (NF) lands within HMU 215 to particular Management Areas, based on a series of factors, such as soils, elevation, community types, accessibility, etc. Lands allotted to MA 3.1, lands where timber harvest is permitted, comprise 3,428 acres, accounting for 69% of the NF lands in the Analysis Area. Lands allotted to MAs 6.1 and 6.2 for the HMU comprise 1,524 acres, or 31% of the NF lands.

1.3.1 Need for Change

The Forest Plan establishes a "Desired Future Condition" (DFC) for each Management Area. The need for change within a particular Management Area is determined by comparing the DFC with the existing ground condition (EC). For MA 3.1 lands within HMU 215, the Interdisciplinary Team (IDT) identified the existing conditions, and then compared them to the DFC to determine where change was needed. Table 1, which displays both the existing

condition and the desired condition, show only those opportunities where DFC can be achieved through vegetative management. The project planning record contains the full comparison of EC to DFC.

Table 1. Acres by Community Type in MA 3.1 for HMU 215

Community Type	Existing	Desired Future Condition	Need
Hardwoods/mixedwoods (regeneration)	0	111	111
Spruce/Fir/Hemlock	493	686	193
Paper Birch (regeneration)	0	33	33
Oak/Pine	29	44	15

A look at Table 1 shows that, in order to meet the habitat and stand structure objectives of the Forest Plan for HMU 215, there is a need to establish regenerating stands of paper birch and northern hardwoods; a need to release spruce-fir from the understory of other stands; and a need to slightly increase or at least maintain the amount of oak/pine community. Commercial timber harvest can be used to achieve these objectives. Even-aged harvest methods can be used to convert mature and overmature northern hardwoods and paper birch stands to a younger, regenerating age class. Uneven-aged harvest methods can be used to increase the acres of spruce-fir by removing the overstory trees where spruce-fir is in the understory. Shelterwood harvest methods combined with prescribed burning can be utilized to improve conditions for oak regeneration. Economically, harvesting mature and overmature trees would provide high quality sawtimber to area mills. At the same time, lower quality or damaged trees can be harvested to improve future stand quality and productivity.

Openings in the forest canopy, or overhead leaf cover, introduce direct sunlight to the forest floor, encouraging the growth of "early-successional" plant species. These plant species thrive in sunlit conditions, and are typically the first to revegetate an area that was once but is no longer shaded. The conditions favoring plants that thrive on direct sunlight are referred to as "early-successional habitat". Some wildlife species need early-successional plant habitat to survive, while other wildlife species utilize a variety of habitats that includes the early-successional habitat. In either case, this habitat is a critical component of a landscape that supports a variety of wildlife. In establishing desired conditions for HMUs, the Forest Plan recognizes the need for early-successional habitat, and permits the use of commercial timber harvest to establish conditions favorable to this habitat in a limited number of acres. This includes harvest methods such as clearcuts, seed tree cuts or shelterwood cuts that remove most of the existing woody vegetation from a stand, and thus promote a component of regenerating and young growth within a larger landscape of mostly mature, closed canopy forest. This kind of "even-aged harvest" is typically employed with those species and community types that regenerate best in early-successional conditions, such as paper birch, aspen and some hardwoods.

At the same time the Forest Plan prescribes even-aged timber harvest to promote early-successional wildlife habitat and vary stand structure, it prescribes an equal amount of uneven-aged timber harvest to promote the regeneration of those plants that thrive in shaded conditions. These plants typically grow best in the understory of a taller forest, often gaining a

foothold where breaks in the canopy introduce a limited amount of sunlight to the forest floor. Uneven-aged harvest removes individual trees or small groups of trees to open pockets of sunlight. Where even-aged harvest maintains different structure from one stand to the next, with different species or communities often dominating from one stand to the next; uneven-aged harvest maintains structural variety within certain stands. Species and community types that regenerate best with uneven-aged harvest include spruce-fir, hemlock, and some hardwoods (sugar maple, oak).

1.4 Modified Proposed Action

The Androscoggin Ranger District proposes to address the Purpose and Need for Action in HMU 215 by applying silvicultural practices to diversify age class and wildlife habitat, improve future stand quality, enhance growing condition for softwoods, and provide quality sawtimber. This action is a modification of the original proposal, which had been presented to the public for comment in June 2004.

The Modified Proposed Action would establish 70 acres of early-successional habitat by clearcut, patch clearcut or seed tree cut in mature and overmature stands of northern hardwoods, paper birch and aspen. It would harvest another 422 acres using the uneven-aged methods of single-tree and small group selection cuts to promote in-stand growth and release small patches of softwoods like spruce-fir and hemlock. And it would treat an additional 29 acres with prescribed burning and a shelterwood preparatory cut to begin improving conditions for oak regeneration, the first of several treatments designed to perpetuate a primarily oak stand. The Project Area totals 521 NF acres (Appendix A, Maps 1 and 2).

To access the harvest areas, approximately 2.1 miles of existing roads (Forest Road 95) and 4 landings would be restored. Roads receiving restoration maintenance are classified Forest Service roads that have been closed to vehicle traffic since their prior use and stabilized with erosion control devices such as water bars. Restoration maintenance is the process of rebuilding a road to the standard originally constructed. It may include removing water bars, sod and brush from the roadbed; cleaning ditches; replacing culverts and stream crossings; and placing and maintaining surfacing. Restored roads would be closed and stabilized until needed again. The portion (1.8 miles) of the Road utilized by the Corridor 19 snowmobile trail will be widened by 2 feet to allow for possible dual use of snowmobiles and vehicle traffic during the winter (as a result of internal concerns). Vehicle travel width will remain the same while road shoulders will be improved for dual use. In addition, this widening will allow for dual use during future harvest periods. Restoration and widening work entails grading roadways, cleaning ditch lines and culverts, and clearing road rights-of-way of limbs and hazard trees.

1.5 Decision Framework

The purpose for this environmental assessment is to provide the District Ranger, the Deciding Official, with sufficient information and analysis to make an informed decision about the Connor Brook Project given the purpose and need for the action. The deciding official would make the following decisions:

1. Which of the alternatives would best move the Connor Brook Project Area toward the DFC outlined in the Forest Plan and the Purpose and Need for Action?

2. Which of the alternatives best addresses relevant issues produced by the public and the interdisciplinary team?

3. Would the Modified Proposed Action and its alternatives, including mitigation measures, pose any significant environmental impact to warrant the need for an environmental impact statement?

1.6 Public Involvement

On June 23, 2004, a scoping letter soliciting comment on the original Proposed Action for the Connor Brook Project was sent to 250 interested people, local newspapers and various agencies and organizations. This project was also listed in the Quarterly Schedule of Proposed Actions for the White Mountain National Forest that is distributed to over 500 people interested in and/or affected by the White Mountain National Forest management. The scoping letter was also posted on our White Mountain National Forest web page (www.fs.fed.us/r9/white). Eight (8) responses to the scoping letter were received. Some of these responses have been used to formulate alternatives and mitigation measures.

1.7 Issues Used to Develop Alternatives

Using issues received from the public and within the agency, the interdisciplinary team (IDT) identified issues that are caused directly or indirectly by implementing the Proposed Action, or can be used to develop site-specific alternatives to meet the Purpose and Need. Appendix C, List of Scoping Comments, lists the issues, concerns and comments raised by the public and the Forest Service responses.

Measurement indicators were developed for each issue and are a means of comparing alternatives. Table 5 in Chapter 2 provides a summary of the characteristics of each alternative, including measurement indicators. One issue raised internally after initial scoping of the project became part of the Modified Proposed Alternative and another issue raised during the scoping process resulted in the development of an alternative to the Proposed Action.

1.7.1 Road widening for dual use

The Modified Proposed Alternative included road widening as a result of internal concerns regarding possible user conflicts on FR95/Corridor 19. The widening allows for future winter vegetation management projects in the area without forgoing recreational use of the snowmobile trail. The measurement indicator for evaluating effects of this issue for each alternative will be the “miles of road widening”.

1.7.2 Roadless Issues

One respondent requested that logging in the Connor Brook area be deferred until (1) the Forest Plan has been revised and (2) the roadless rule has been settled. This issue is addressed in Alternative 3, which is described in Chapter 2. The measurement indicator for evaluating the effects of this issue for each alternative will be the "acres harvested within the Wild River Roadless area".

1.8 Applicable Regulatory Requirements & Required Coordination

NFMA (National Forest Management Act)

NFMA gives direction for developing, maintaining and revising plans for individual units of the National Forest System. This includes direction for maintaining multiple use and sustained yield of forest products and services, insuring consideration of economic and environmental aspects of various systems of resource management, providing for diversity of plant and animal communities, and insuring that timber will be harvested only where suitable. As an example, the wildlife strategy developed in the 1986 White Mountain National Forest Plan provides the direction for managing for wildlife habitat diversity on the Forest.

NEPA (National Environmental Policy Act)

NEPA gives direction to analyze and assess environmental conditions and consequences of planned and proposed actions. CEQ (Council on Environmental Quality) Regulations and the Forest Service Manual and Handbooks give direction and guidelines for conducting the analysis.

New Hampshire SHPO (State Historic Preservation Officer) Review

Before a decision is made for a project, State Historic Preservation Office (SHPO) reviews the cultural resource report for the project. The Forest Archeologist has reviewed the cultural resource report and we have received concurrence from SHPO.

MBTA (Migratory Bird Treaty Act)

This project is consistent with the Migratory Bird Treaty Act. The White Mountain National Forest is actively involved with the Partners in Flight program to protect neo-tropical migrants. The Forest also recently completed a Species Viability Evaluation (SVE) process to identify species that might have a potential viability concern on the Forest. Migratory birds were considered in this review. Any species identified through this process, including migratory birds, that have a viability concern are evaluated.

USFWS (United States Fish and Wildlife Service)

The USFWS will be asked to review the biological evaluation (BE) for federally listed threatened and endangered species (TES) prior to any decision.

CHAPTER TWO – ALTERNATIVES

2.0 Formulation of Alternatives

This chapter provides a detailed description of the Modified Proposed Action and alternatives to the Modified Proposed Action. Alternative 1, referred to as the "No Action" alternative, proposes that no vegetative management activities be conducted within the Connor Brook Project Area. Consideration of a No Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA), and is intended to contrast the effects of no action to the effects of action alternatives. Alternatives 2 and 3 are referred to as "Action Alternatives", since each of these alternatives proposes some level of vegetative management activities within the Connor Brook Project Area. Alternative 2 is the "Modified Proposed Action". The original version of this alternative was submitted to the public for comment in June 2004. Alternative 3 is the "Excluded Roadless Area Action". This alternative incorporates changes resulting from public comments. Each of the Action Alternatives meets the Purpose and Need for Action, although there are differences in the degree to which each alternative moves towards the Desired Future Condition described in the Forest Plan.

The process of designing alternatives to address the Purpose and Need for Action began with a review of existing conditions for HMU 215. Compartment vegetative data and records were reviewed to identify stands that could benefit from silvicultural treatment. This data was verified through aerial photographs and field reconnaissance. Site specific concerns related to other resources (such as soil, water, recreation, etc.) were identified and addressed either through mitigation measures or deferring silvicultural treatment where appropriate. Alternative actions were considered for silvicultural treatments, and for contributing towards the Desired Future Condition of the HMUs. From all of these considerations, the Proposed Action was developed and submitted to the public for comment (scoping) in June 2004. The Excluded Roadless Area Action was developed to address issues raised by the public during the scoping process.

The Forest Plan lists specific mitigation measures, called Standards and Guidelines, for controlling or alleviating the environmental effects of timber harvesting, road restoration and regular road maintenance. These Standards and Guidelines are required when conducting these activities on the White Mountain National Forest, and they are incorporated into this project by reference. Additional mitigation measures, which go above and beyond the Forest Plan Standards and Guidelines, have also been developed to address concerns specific to the Proposed Action and the alternatives. These site-specific measures, described in Appendix D, are intended to mitigate specific resource effects. They have been developed either as a result of ongoing research or as a result of monitoring and evaluation of past similar actions on the White Mountain National Forest and elsewhere. Most information used to develop these additional mitigation measures has been accumulated over the past 15 years of implementing the Forest Plan.

2.1 Description of Alternatives

2.1.1 Alternative 1: No Action Alternative

While this alternative does not meet the Purpose and Need for Action, it does provide a basis for analyzing the effects of conducting no vegetative management activities (No Action) in the Project Area, and comparing these effects with those alternatives that propose some level of vegetative management. This alternative is required by regulations implementing the National Environmental Policy Act (NEPA). This alternative would not harvest any trees, conduct any road restoration, or implement any other connected actions. This alternative would not meet Forest Plan expectations for sustained timber products and diverse wildlife habitat in HMU 215 for the foreseeable future

There would be no change to the existing condition of the area except from natural occurrences, ongoing recreation activities, and road and trail maintenance. This alternative responds to those who want no timber harvesting, road work, prescribed fire, or active wildlife habitat management to take place. Choosing this alternative would not preclude proposing vegetative management or other activities in this area at a later date. Prescribed burning proposed for stand 44/9 may occur as a separate project.

2.1.2 Alternative 2: Modified Proposed Action

The Modified Proposed Action and its connected actions were developed to optimize the Purpose and Need for Action with the most current information available at that time. It would involve harvesting 521 acres by a combination of even-aged and uneven-aged management methods (Table 2). This alternative would provide approximately 2.02 million board feet of sawtimber and pulpwood, and improve future stand quality and productivity. Modifications to the original scoped action include prescribed burning in Compartment 44, Stand 9 to enhance and perpetuate the Oak community, a widening of the Connor Brook Road to allow for future winter dual-use options (snowmobiles and vehicle traffic) instead of restricting the area to summer harvesting only and a change of season of operation from winter to summer in stands 43/14c, 44/6c and 44/17. Alternative 2 is displayed in Map 2 in Appendix A.

This alternative responds to the need to create uneven-aged stands in hardwood, mixedwood and softwood community types by creating a mixture of tree ages, size classes and species composition. Using clearcutting and seed tree cuts to help accomplish the desired wildlife habitat composition (Table 5), this alternative responds to the need to create early-successional habitat within the HMU by converting mature northern hardwoods and paper birch stands to the 1-10 year old age class. It is the preferred Alternative of the Forest Service.

Table 2. Alternative 2: Proposed Treatments and Acreage

Proposed Treatment	Alt 2
Clearcut & Patchcut (CC/PC)	**56**
Seed Tree Cut (STC)	**14**
Shelterwood Cut	**29**
Group Selection Cut (GS)	**156**
Individual Tree and Group Selection (ITS&GS)	**266**
Total Harvest Area	**521**
Prescribed Burn	**29**

The operating season for each stand was based on field visits to evaluate roads, site moisture conditions and ecological land types (ELTs) (Table 7). Based on these characteristics, stands requiring winter harvest will be harvested when the ground is frozen (December through March). During harvest operations, trees would either be processed in the woods or at the landing site. Tops of trees processed in the woods would remain on the ground. The tops of trees processed at the landing would have to be returned to the harvest site and scattered. Site-specific mitigation measures for this alternative are found in Appendix D.

Connected Actions

Approximately 2.1 miles of existing roads (Forest Road 95) and 4 log landings would be restored. The portion (1.8 miles) of the Road utilized by the Corridor 19 snowmobile trail will be widened by 2 feet to allow for possible dual use of snowmobiles and vehicle traffic during the winter (as a result of internal concerns). In addition, this widening will allow for dual use during future harvest periods. Restoration and widening work entails grading roadways, cleaning ditch lines and culverts, and clearing road rights-of-way of limbs and hazard trees.

Prescribed burning in Compartment 44, Stand 9 will be undertaken in combination with a shelterwood preparatory cut (or as a separate project) to enhance and perpetuate the Oak community type found within this stand. Fire control lines would be constructed with hand tools and/or a bulldozer prior to the prescribed burn to contain the spread of fire. The lines would typically be scarified to mineral soil.

Alternative 2 is the preferred alternative of the Forest Service because it meets the Purpose and Need for Action by improving vigor and growth in some of the stands through individual tree harvesting and group selection; helping to meet some of the wildlife habitat composition needs (Table 5) through clearcuts, seed tree cuts and shelterwood cuts; releasing understory vegetation, and enhancing growth and regeneration of softwoods on naturally occurring sites; and providing a sustained level of quality forest products for the market.

2.1.3 Alternative 3: Excluded Roadless Area Action

Alternative 3 is a variation of the Modified Proposed Action and prescribes a reduced amount of acreage harvested as a result of a public comment. Stand prescriptions for Alternative 3 are displayed on Map 3 in Appendix A. Changes (Table 6) from the Proposed Action are:

- 225 acres (all of Stands 43/14a,b&c, 43/17a&b, 43/22a,b&c, 43/26a&d, 43/31, 44/12a, 44/13a, 44/17, 44/26a&b, 45/4, 45/9a&b and 13 acres of Stand 44/25) within the 2004 Wild River Roadless Area are eliminated from the project area.

Table 3. Alternative 3: Proposed Treatments and Acreage

Proposed Treatment	Alt 3
Patch Cuts (PC)	**4**
Seed Tree Cut (STC)	**8**
Shelterwood Cut	**29**
Group Selection Cut (GS)	**94**
Individual Tree and Group Selection (ITS&GS)	**161**
Total Harvest Area	**296**
Prescribed burn	**29**

Connected Actions

The connected actions for road improvement would be the same as Alternative 2, but limited to 1.8 miles in length (.3 miles of road restoration and one landing would be eliminated from the project area). The prescribed burning in stand 44/9 would occur prior to any harvesting for each of the action alternatives or may be undertaken as a separate project.

2.2 Alternatives Considered but Eliminated from Detailed Study

2.2.1 Original proposed action

The original Proposed Action, which had been presented to the public for comment in June 2004 was modifed in response to timber harvesting in proposed roadless area concerns raised by the public during the scoping process, as well as new information from updated field inventories and internal review. Modifications include a change of season of operation from winter to summer in stands 43/14c, 44/6c and 44/17 due to a typing error in the scoping letter, a widening of the Connor Brook Road to allow for future winter dual-use options (snowmobiles and vehicle traffic) instead of restricting the area to summer harvesting only, and an error made in assuming the prescribed burn in stand 44/9 was addressed in a Forest-wide Ecosystem Restoration and Hazardous Fuels Reduction Project document released in April 2004. All aspects of the prescribed burn will be addressed in this EA. In addition to the above changes to the proposed action, earlier considerations to reroute the snowmobile trail to private lands or other National Forest lands, or simply closing the trail to reduce FR 95 vehicle/snowmobile conflicts were abandoned in favor of road widening due to the ease of widening vs. trail relocation and the value of this corridor trail to the local area.

2.2.2 Uneven-aged management only

We considered an alternative which would use only uneven-aged management as a method of harvesting. This alternative was eliminated because it does not meet the Purpose and Need for Action as directed by the Forest Plan. One of the goals for MA 2.1 and 3.1 lands is to provide a balanced mix of habitats for all wildlife species. HMU 215 has a shortage of early-successional habitat and the Forest Plan identifies the use of even-aged management, primarily through commercial timber harvests using clearcuts or seed tree cuts, to maintain and/or increase this habitat.

2.3 Comparison of Alternatives –Actions and Outputs

The following tables display characteristics for each of the alternatives. Table 4 is a summary of comparisons for alternatives.

Table 4. Summary of Comparison of Alternatives.

MEASURE	UNIT	ALT 1	ALT 2	ALT 3
PROPOSED HARVEST AREA	Acres	0	521	296
• **Winter Only Harvest**	Acres	0	53	0
• **Summer/Fall Harvest**	Acres	0	468	296
• **Clearcut & Patchcut**	Acres	0	56	4
• **Seed Tree Cut (STC)**	Acres	0	14	8
• **Shelterwood Cut**	Acres		29	29
• **Group Selection Cut**	Acres	0	156	94
• **Individual Tree & Group Selection (ITS&GS)**	Acres	0	343	161
• **Harvest Volume**	MBF	0	2,020	935
ESTIMATED STUMPAGE RECEIPTS	$	0	363,964	168,468
10% YIELD TAX RECEIPTS (To Town of Shelburne)	$	0	36,396	16,847
25% FUND PAYMENTS (To Coos County)	$	0	90,991	42,117
ESTIMATED FOREST SERVICE COSTS	$	55,800	112,360	81,980
ROAD RESTORATION MAINTENANCE	Miles	0	2.1	1.8
Prescribed Fire	Acres	0*	29	29
Dual Use road work	Miles	0	1.8	0

* Prescribed Fire may be undertaken as a separate project

Table 5. HMU 215 - Comparison of the Acres Needed to Achieve DFC to the Proposed Acres of Accomplishments, by Alternative (Alt).

HABITAT TYPE	NEED	PROPOSED ACCOMPLISHMENT		
		Alt 1	Alt 2	Alt 3
HMU 215				
Northern Hardwood/mixedwoods (regeneration)	**111**	0	56	4
Spruce/Fir/Hemlock	**193**	0	23	14
Paper Birch (regeneration)	**33**	0	14	8
Oak/Pine	**15**	0	0	0

Table 6. HMU 215 - Stand Harvest Prescription & Acreage by Stand for the Action Alternatives.
Rx (Stand Prescription) abbreviations are: CC (Clearcut), PC (Patch Clearcut <10 acres), STC (Seed Tree Cut), ITS (Individual Tree Selection), GS (Group Selection), SHC (Shelterwood). Since Group Selection harvests only a portion of the stand, the actual harvest acres are listed in parentheses. Season of operation: S – Summer (Jun-Oct), W – Winter (Dec-Mar).

Compartment	Stand	Alternative 2		Season of Operation	Alternative 3		Season of Operation
HMU 215		**Rx**	**Acres**		**Rx**	**Acres**	
43	14a	ITS/G	11	S	X	X	X
43	14b	PC	6	S	X	X	X
43	14c	PC	4	S	X	X	X
43	17a	STC	6	S	X	X	X
43	17b	ITS/G	10	S	X	X	X
43	22a/c	GS	6 (1)	S	X	X	X
43	22b	PC	7	S	X	X	X
43	26a	GS	37 (6)	S	X	X	X
43	26d	ITS/G	5	S	X	X	X
43	31	PC	8	W	X	X	X
44	4	GS	36 (5)	S	GS	36 (5)	S
44	6a	STC	8	S	STC	8	S
44	6b	ITS/G	22	S	ITS/G	22	S
44	6c	PC	4	S	PC	4	S
44	6d	ITS/G	54	S	ITS/G	54	S
44	7	GS	31 (5)	S	GS	31 (5)	S
44	9	SHC	29	S	SHC	29	S
44	10a	ITS/G	23	S	ITS/G	23	S
44	11	ITS/G	62	S	ITS/G	62	S
44	12a	ITS/G	11	S	X	X	X
44	13a	CC	11	W	X	X	X
44	17	GS	6 (1)	S	X	X	X
44	25	GS	40 (6)	S	GS	27 (4)	S

Compartment	Stand	Alternative 2		Season of Operation	Alternative 3		Season of Operation
HMU 215		**Rx**	**Acres**		**Rx**	**Acres**	
44	26a	PC	8	S	X	X	X
44	26b	ITS/G	42	S	X	X	X
45	4	ITS/G	14	W	X	X	X
45	9a	ITS/G	12	W	X	X	X
45	9b	PC	8	W	X	X	X

CHAPTER THREE - AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This analysis will consider the effects of the project proposal on the following resources: Vegetation; Recreation; Visual Quality Objectives; Roadless/Wilderness Characteristics, Soils (Erosion and Calcium); Water (Quantity & Quality); Fisheries; Wildlife (Habitat, Management Indicator Species, Other Species of Concern, Habitats of Concern); Invasive Plants; Federal Threatened, Endangered, and Proposed Species (TEPS), and Regional Forester Sensitive Species (RFSS); Heritage Resources; and Socio-economics.

Specific issues regarding resources that were raised during the scoping process (see Section 1.7) are addressed in this chapter. Each resource section is organized as follows:

- Issues Related to the Resource which generate an Alternative
- Description of Affected Environment (Existing Condition)
- Analysis of Direct and Indirect Effects on the Resource (By Alternative)
  - Direct Effects are caused by the action and occur at the same place and time
  - Indirect Effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- Analysis of Cumulative Effects on the Resource (By Alternative)
  - Cumulative Effects result from the incremental impact of the action when added to other past, present and reasonably foreseeable actions, regardless of which government agency or individual undertakes such other actions.

3.2 Vegetation

No Issues Related to Vegetation

3.2.1 Affected Environment for Vegetation

The Analysis Area has been actively managed for wood products for over 100 years due to its natural tendency to regenerate and produce high quality trees. Logging has played an important role in the White Mountains since the 19th century and present vegetative conditions are largely the result of this past logging and recent forest management. There is no documentation or evidence that the Analysis Area was or is considered prime farmland due to the rocky nature of the soils. This section describes the various age classes and condition of vegetation over the landscape, ranging from newly regenerated stands to overmature forests.

The Analysis Area for direct and indirect effects on vegetation is MA 3.1 lands within HMU 215 which permit vegetative management using various silvicultural techniques. The analysis area encompasses 3,428 NF acres. Approximately 64.4% of these lands (2,206 NF acres) comprise a closed-canopy forest of mature and overmature even-aged and uneven-aged stands. The amount of closed and open canopy within MA 3.1 provides a picture of the structural diversity within the Analysis Area.

Many of the stands within MA 3.1 in HMU 215 that have been identified for vegetative treatment are overstocked mature northern hardwoods or mixedwood stands containing trees that have low timber quality, are approaching an age where mortality is imminent, or have some damaged component within a stand. According to the *Silvicultural Guide for Northern Hardwood Types in the Northeast* (Leak et al. 1987) and *Silvicultural Guide for Paper Birch in the Northeast (revised)* (Safford 1983) commercially treating these stands would improve the quality and vigor of remaining trees. Existing stand conditions are summarized in Table 7.

The Analysis Area for cumulative effects on vegetation encompasses public lands within HMU 215, and adjacent private land within one of mile of HMU 215. The cumulative effects time period spans a period that considers activities ten years in the past and ten years in the future (1994 to 2014). Ten years was the time period selected because it represents the length of time after a stand is harvested when it is considered in the regeneration phase of development (i.e. the canopy is not fully closed and sunlight can penetrate the majority of the ground).

Within HMU 215, harvesting on National Forest MA 3.1 lands has totaled 0 acres over the past 10 years, 0% of the allowable harvest acres.

There is approximately 4,000 acres of private lands within in one mile of HMU 215's boundary, primarily MeadWestVaco land. Aerial photos as recent as 1995, show owners of adjacent private lands conducting management activities similar to those on the National Forest, including timber harvest. The largest private forest land manager (Mead WestVaco) has indicated they do not have any timber harvests planned for the next 10 years.

Future projects in the Connor Brook project area include an assessment of sources of instability in the Connor Brook watershed. Sources appear to occur in the headwaters where currently no timber harvesting is proposed. Actions proposed in the next 5-10 years would reduce the intensity of spring run-off and precipitation run-off events in the watershed.

Table 7. Existing Conditions for Stands Eligible for Vegetative Treatment (HMU 215).

Stand	Community Type	Species Mix	Age	Comment
43/14a	Northern Hardwood	Sugar Maple, Yellow Birch, Beech, Red Spruce	134	Harvested in 1983
43/14b	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Northern hardwoods
43/14c	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Quality northern hardwoods
43/17a	Mixed Hardwoods	Sugar and Red Maple, Yellow and Paper Birch, Beech	144	Mature Paper Birch

Stand	Community Type	Species Mix	Age	Comment
43/22a&c	Northern Hardwood	Sugar Maple, Yellow Birch, Beech, Red Spruce	134	Harvested in 1983
43/22b	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Harvested in 1983
43/26a	Hemlock	Red Spruce, Hemlock, Fir	114	Overmature Hemlock & Red Spruce w/ well established softwood regeneration
43/26d	Northern Hardwood	Sugar Maple, Yellow Birch, Beech, Red Spruce	114	Mature northern hardwoods
43/31	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	144	Mature northern hardwoods
44/4	Hemlock	Red Spruce, Hemlock, Fir	104	Dense Hemlock w/hardwoods & deer use
44/6a	Other Hardwood	Paper Birch, Red Maple, Beech	104	Other hardwoods and mature Paper Birch
44/6b	Northern Hardwood	Sugar Maple, Yellow Birch, Beech, Red Spruce	104	Northern hardwoods w/softwood component
44/6c	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	120	Mature northern hardwoods
44/6d	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	104	Mature northern hardwoods w/occ. bear claw
44/7	Hemlock	Red Spruce, Hemlock, Fir	104	Mature Red Spruce w/established softwood regeneration and deer use
44/9	Oak	Red Oak, Northern Hardwoods	144	Over mature & mature hardwoods
44/10a	Hemlock	Red Spruce, Hemlock, Fir	94	Mature Red Spruce & White Pine
44/11	Northern Hardwood	Sugar Maple, Yellow Birch, Beech, Hemlock, Red Spruce	114	Harvested in 1983
44/12a	Hemlock	Red Spruce, Hemlock, Fir	114	Mature Hemlock, Red Maple, Yellow Birch w/high risk trees
44/13a	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Over mature northern hardwoods
44/17	Hemlock	Red Spruce, Hemlock, Fir	114	Mature softwoods w/Red Maple & Yellow Birch

Stand	Community Type	Species Mix	Age	Comment
44/25	Hemlock	Red Spruce, Hemlock, Fir	114	Harvested 1983. Fir mortality
44/26a	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Well stocked mature northern hardwoods
44/26b	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	134	Two-aged hardwoods
45/4	Northern Hardwood	Sugar Maple, Yellow Birch, Beech, Aspen	70	Immature hardwoods, mature Aspen
45/9a	Hemlock	Red Spruce, Hemlock, Fir	104	Overmature softwoods
45/9b	Northern Hardwood	Sugar Maple, Yellow Birch, Beech	104	Overmature hardwoods

3.2.2 Direct and Indirect Effects on Vegetation

The prescribed burning in stand 44/9 may occur in association with each of the action alternatives (or as a separate project) and would be carried out pre-harvest in order to better reduce the litter layer and hardwood competition in the understory in combination with the harvest. The location of fire control lines using the contour of the slope as a guide and implementation of post-burn erosion control measures where needed will minimize the short-term impact on exposed soil by preventing the erosion of topsoil and aid in re-establishment of vegetation on the site. Seedling establishment may be increased by the burn due to a decrease in litter depth and exposure of mineral soil. Competition from other species might be reduced and the proportion of oaks in advanced reproduction might be increased with fire (Rouse, 1986).

Alternative 1: No Action

There would be no direct effects from timber harvest and road restoration activities, such as openings in the forest canopy, residual tree damage or soil compaction. Any openings in the forest canopy would be the result of natural mortality of standing trees or disturbance (weather event, infestation, etc.). There would be no indirect effects from timber harvest and road restoration activities, such as establishing new stands of regenerating hardwoods, soil erosion or soil calcium loss. Age class and structural (canopy) diversity would remain unchanged.

Alternative 2: Modified Proposed Action

Stands with prescriptions for individual tree and group selection harvest (see Table 6) would create small patches of 1/20 to 1/2 acre in size to release or regenerate softwood and shade intolerant hardwood species in mixedwood stands. Group selection cuts are the typical harvest method used in mixedwood stands and would harvest approximately 17-20% of the stand. These treatments would maintain an uneven-aged stand leading to greater diversity of age classes and species. Overall, the health and vigor of stands would be improved, resulting in increased growth rates on selected quality sawtimber trees.

Clearcut harvest prescriptions (CC and Patchcut treatments in Table 6) would create opportunities for early-successional wildlife habitat by removing trees and promoting

regeneration. Clearcuts would generally be located in areas of low quality and/or mature trees to allow the next generation of trees the opportunity to grow at their full potential.

The seed tree cut prescription for stands 43/17a and 44/6a would regenerate paper birch by opening up the stand and retaining scattered paper birch seed trees. The shelterwood preparatory cut prescription for stand 44/9 is the first of 2 or 3 intermediate treatments intended to provide adequate oak regeneration.

Alternative 2 would move HMU 215 towards its DFC, as well as increase structural and age class diversity. A total of 70 acres of mature forest would be converted to regenerating stands (including 56 acres of northern hardwoods and 14 acres of paper birch); maintaining and enhancing this age class habitat component in the HMUs (see Section 2.1, Table 2).

A direct effect of clearcutting in northern hardwood stands is the promotion of stump sprouts in species such as ash, maple and birch. According to a study on four sites in New England, *Whole-tree Clearcutting in New England: Manager's Guide to Impacts on Soils, Streams, and Regeneration* (Pierce et al. 1993*)*, stump sprouting and germination of new seedlings began in the first growing season after harvest. Within five years after cutting, young, dense stands were established on all four sites. Stocking surveys conducted on the Forest three years after treatment showed successful regeneration in even-aged and uneven-aged harvested stands.

There should be little direct effects to many herbaceous plant species since they have adapted to surviving in clearcuts or can quickly re-colonize these areas a short time afterwards (Whitman and Hagan 2000).

Winter harvesting over a snow pack can minimize damage to understory vegetation from repeated passes of logging equipment. However, use of mechanical harvesters results in minimal damage to existing understory vegetation, even during summer operations. Using pre-existing skid trails as much as possible and new trails would be laid out prior to operation to reduce the area affected would minimize damage. Widening 1.8 miles of FR 95 will result in a loss of an additional two feet of vegetation in some areas to accommodate the dual-use road.

Indirect effects include an increased risk of windthrow in the partially cut stands, and to trees adjacent to clearcuts, patch clearcuts and widened areas of FR 95. Trees exposed to the wind on wet sites are susceptible to windthrow until crowns expand to fill the canopy and the roots become windfirm. Alternative 2 would encourage softwood regeneration in 358 acres of mature and overmature mixedwoods, spruce/fir, and hemlock habitat.

In some instances, fire may stimulate the growth of oak trees, as reflected by incremental increases in height and/or diameter (Rouse, 1986). Mortality of stressed trees due to insect, disease and/or damage may be increased as a result of prescribed burning. Some residual tree damage would occur from harvesting operations, but skid trails are often planned adjacent to trees marked for removal in order to provide adequate working space for logging equipment.

Alternative 3: Excluded Roadless Area Action

Due to public comment, Alternative 3 was developed as a modification of the Proposed Action. The effects of this alternative are a reduction in the number of treated stands, no winter harvesting, no widening of Connor Brook road, an increased unit cost per mbf of timber

harvested and the lowest return to local communities through the timber tax and the 25% fund (Table 17). The opportunities to meet HMU wildlife habitat objectives (Desired Future Conditions) are also significantly reduced (Table 5). The 296 acres proposed for harvest include a reduction from Alternative 2 of 167 acres of uneven-aged harvest and 58 acres of even-aged regeneration harvest. Alternative 3 would encourage softwood regeneration in 201 acres.

3.2.3 Cumulative Effects on Vegetation

Alternative 1: No Action

This alternative will not contribute incrementally to the effects of timber harvest or land clearing within the Analysis Area over the 20-year period from 1994-2014. Without timber harvest now or over the next 10 years; species, age class and structural diversity will remain static or diminish on National Forest lands within HMU 215. Diversity may be enhanced by natural disturbance, such as a weather event, fire, disease or an infestation that can create forest openings and provide some limited opportunities for shade intolerant plant species. However, on National Forest lands, regenerating and young stands will age and grow closer to the surrounding canopy. This will have the effect of reducing sunlight to the forest floor and reducing early-successional habitat for wildlife. Mature stands of the short-lived (50-60 years) paper birch and aspen community types will continue to age towards mortality, many to be replaced by shade tolerant species now growing in the understory of these stands.

Action Alternatives 2 and 3

The two Action Alternatives will contribute incrementally to the effects of timber harvest or land clearing within the Analysis Area over the 20-year period from 1994-2014. These effects are well within the effects anticipated and analyzed in the Final Environmental Impact Statement for the 1986 Forest Plan. Cumulative effects upon vegetation of the prescribed burn in stand 44/9 include a perpetuation of habitat diversity as oak trees would be favored at the expense of other fire-intolerant species. No effects are expected from the future watershed project.

The Forest Plan permits 80% to 90% of the lands within MA 3.1 to be managed using even-aged silvicultural techniques. The remaining 10% to 20% of MA 3.1 lands may be managed using predominately uneven-aged treatments. Even-aged harvest has the effect of reducing the acres in closed canopy forest and contributing to age class variation within the forested landscape. Table 8 compares the cumulative timber harvesting and other stand regenerating activities on MA 3.1 lands, for all of the alternatives.

Table 8. Cumulative Regeneration on NF Lands in HMU 215, in acres. Even-aged regeneration harvest is noted in parenthesis (Includes clearcut, seed tree cut and shelterwood prep cut).

Harvest Time Frame	Alt 1	Alt 2	Alt 3
Harvesting on NF acres in the past 10 years	0	0	0
Proposed NF acres for harvest	0	521 (99)	296 (41)
Foreseeable NF harvest acres in the next 10 years	0	0 (0)	0 (0)
Cumulative NF acres harvested from 1994-2014 % of all MA 3.1 % of all MA 3.1 in 0-10 age class	0 0	521 15% 2.9%	296 9% 1.2%
Acres below DFC (206 total-111 acres for NH, 33 ac-PB, 23 ac-Aspen, 35ac-Sp/F, 4ac-Oak/Pine regen.) for Regeneration Habitat in MA 3.1	0	107	165

Within the time period of 1994 through 2014, Alternative 2 proposes to harvest approximately 521 acres, or 15% of the MA 3.1 lands in HMU 215. Regeneration resulting from even-aged harvest during this time period will have reduced the closed forest canopy by 99 acres, maintaining 95.5% of MA 3.1 in closed canopy. This alternative would fall 107 acres short of the DFC for early-successional habitat in HMU 215.

Over the 20-year period from 1994 to 2014, Alternative 3 proposes to harvest approximately 296 acres, or 9% of the MA 3.1 lands in HMU 215. Regeneration resulting from even-aged harvest during this time period will have reduced the closed forest canopy by 41 acres, maintaining 98.1% of MA 3.1 in closed canopy. This alternative would fall 165 acres short of the DFC for early-successional habitat in HMU 215.

3.3 Recreation

No Issues Related to Recreation

3.3.1 Affected Environment for Recreation

Recreation resources within HMU 215 include the Shelburne hiking trail and a portion of the Corridor 19 snowmobile trail, both of which utilize the Connor Brook road (FR 95).

The Analysis Area for direct and indirect effects on recreation is the MA 3.1 land within HMU 215, encompassing 3,428 NF acres. Recreation settings for the Connor Brook Analysis Area are described by the Recreation Opportunity Spectrum (ROS). ROS defines a range of unique recreation experiences as: Primitive, Semi-Primitive Nonmotorized, Semi-Primitive Motorized, Roaded Natural and Rural (USDA, 1986a, LRMP). All of the proposed harvest units are associated with a ROS classification of "Semi-Primitive Motorized" (predominately natural appearing environment with evidence of human users) in MA 3.1. The recreation experiences associated with this classifications allows evidence of motorized use, human activity and resource utilization associated with timber harvest (USDA, 1986a, LRMP). Timber harvest has occurred in the Project Area in the past, so the recreation experience is not expected to change.

The Analysis Area for cumulative effects on recreation will include all public lands within HMU 215. The cumulative effects time period would span a period of ten years in the past to ten years into the future, which is the same as for vegetation, since any effects to recreation are a direct result of activities associated with the proposed vegetation management.

3.3.2 Direct and Indirect Effects on Recreation

Results of the prescribed burn of stand 44/9 would not be visible from FR 95 or hiking trails in the area due to location and residual vegetation within the stand. Traffic on the Shelburne trail will be increased around the time of the burn and smoke may be visible from viewpoints both near and far but will die down once the burn is completed.

Alternative 1: No Action

Alternative 1 would not alter current recreation opportunities. The vegetative landscape along Forest roads and the Shelburne Trail within the Project Area would remain unaltered by logging activity. Road and trail maintenance would occur at regularly scheduled intervals.

Alternative 2: Modified Proposed Action

There is one hiking trail located within the analysis area, the Shelburne trail which is adjacent to many of the proposed stands. Although this trail receives very little use, summer harvesting will have an impact on hikers. Other recreationists, such as mountain bikers, swimmers, campers, hunters, and sightseers who visit the area could be disturbed by noise, traffic, or dust created by hauling. The road will be widened to accommodate simultaneous use of both logging trucks and snowmobiles, but dual use conflicts will be kept to a minimum by requiring winter harvesting to begin after the ground freezes but before snow amounts can support heavy snowmobile traffic. If dual use situations cannot be avoided, hauling will not be permitted during weekends and holidays. Safety hazard and speed limit signs would be posted informing the public of ongoing logging activities.

Short-term effects from noise and traffic generated by harvest operations would not persist once operations were completed.

Roadwork associated with the dual use widening and reconstruction of FR 95 will change the present trail-like appearance of sections of the road to that of a gravel surface forest road free of vegetation and surface water.

This alternative, through timber harvest and prescribed fire, would establish early successional forest stands that would provide habitat and browse for certain bird and game species. Game hunters and nature viewers would also benefit by the additional early successional habitat that attracts wildlife such as moose and certain bird species.

Alternative 3: Excluded Roadless Area Action

Alternative 3 would have effects similar to Alternative 2. It differs in that all timber harvest in HMU 215 would occur in summer, outside the peak recreation period.

3.3.3 Cumulative Effects on Recreation

The Modified Proposed Action (Alternative 2) is the only alternative considered in detail in this document that impacts the recreation opportunities identified in the Forest Plan for the Project Area. Alternative 3 does impact the recreation experience, but not to the same degree. Alternative 2 would actually decrease future potential snowmobile/vehicle conflicts due to the proposed road widening. When normal mitigation measures are employed, recreation activities and timber harvesting have co-existed, and can continue to co-exist without substantial or permanent effects on recreation opportunities and public safety. Over the next 10 years no additional timber harvest is anticipated on public lands within the HMU, so no cumulative impacts from logging activity are expected. No effects are expected from the future watershed project.

3.4 Visual Quality Objectives

No Issues Related to Visual Quality Objectives

3.4.1 Affected Environment for Visual Quality Objectives

The Project Area lies within the lower- to mid-mountain slopes ranging in elevation from 1,000 ft. to 1,700 ft. The landscape is characterized by large expanses of hardwood and softwood forests intermixed amongst streams and upper-mountain slopes. There are a variety of textures visible in the area resulting largely from past harvest and land clearing activities. Scenic views alongside East Brook will be preserved by riparian zone mitigation measures.

All areas within the Forest have been inventoried and assigned Visual Quality Objectives (VQO) (USDA, 1986a, LRMP) based on guidelines established by the Forest Plan to evaluate planned changes to scenery. As vegetation over the landscape changes and our analysis becomes better defined due to advanced computer modeling, we can better evaluate the VQOs for a specific area. Using a three dimensional terrain and vegetation model and taking into account the height of current vegetation, the best viewpoints to see into the analysis area are from the Shelburne Trail and from atop Mt. Crag to the north. The majority of the Project Area is mapped as Variety Class B (Common, features contain variety, but tend to be common and are not outstanding by visual quality) and has a Sensitivity Level Rating of 2 (Average, based on moderate use by

viewers to the view corridor/viewshed) or 3 (Lowest, based on the low use by viewers to the view corridor/viewshed).

Two viewpoints were used to analyze visual effects for HMU 215: Mt. Crag and the Shelburne Trail at 3200'. The areas viewed from these viewpoints comprise the **Analysis Area for direct, indirect, and cumulative effects on visual quality.** From these vantage points, there is evidence of past management practices on the Forest in the form of smaller openings from patch cuts and structural diversity from uneven-aged management. A viewpoint from the bridge on the North Road in Shelburne was also chosen for the view into the Connor Brook watershed, but no stands in the project area were visible from here. Cumulative effects analysis will encompass past, present and future activities spanning the 20-year period from 1994 to 2014.

3.4.2 Direct and Indirect Effects on Visual Quality Objectives

Results of the prescribed burn of stand 44/9 would not be visible from FR 95 or hiking trails in the area due to location and residual vegetation within the stand.

Alternative 1: No Action

Alternative 1 would not make any immediate changes to the existing landscape, nor would it have any direct effects on visual quality on National Forest land. Over time, the landscape will change through natural mortality and disturbance (i.e. ice or wind storms).

Action Alternatives 2 and 3

The direct impacts of even-aged and uneven-aged management would result in short-term textural changes in the existing tree canopy as seen from the primary viewpoints. Even-aged management offers more textural change than uneven-aged management. The size, position, and design of clearcuts may possibly have some short-term direct effects on visual aesthetics, but these can be minimized by scattering the openings across the landscape, creating irregular shaped units and feathering the edges, and leaving groups of reserve and wildlife trees throughout the area. Some of the proposed clearcuts and will be slightly visible from some viewpoints; but, since there are existing clearcuts already visible from the viewpoints, they would not represent a dramatic change to the landscape.

Single-tree and small group selection treatments in uneven-aged stands would result in removal of 1/4 to 1/3 of the basal area. The stands would continue to appear natural, and would regain foliar density within a few years as forest floor vegetation grows back and tree canopies increase in size due to the added sunlight. In some instances, uneven-aged management may enhance visual quality by extending the view into the stand.

Based on the Forest Plan Visual Quality Guidelines, Table 9 displays the maximum number of acres that may be observed from a viewpoint for any one opening, either from a stationary observation or a vehicle oriented observation.

Table 9. Allowable Observed Acres of Individual Openings. (Forest Plan Visual Qual Guidelines, observed from designated viewpoint)

VQO	Distance Zone	Stationary Observation (Acres)	Vehicle Observation (Acres)
Modification	Foreground	5	10
Modification	Middleground	15	20
Modification	Background	25	30

Table 10 compares for each of the action alternatives the number of clearcut acres visible from each view point with and respective encompassing vistas within the Project Area. The acres seen from each viewpoint listed in the table are generated from a computerized visual analysis model and confirmed with on-site visits and photos. By designing irregularly shaped units and conforming to the topography, the Forest Service is able to minimize visual impacts while still optimizing wildlife habitat needs. Comparing the amount of acres visible for the two action alternatives, there would be 10 fewer acres of visible openings seen from Mt. Crag under Alternative 3.

Table 10. Visibility of Clearcuts and Acres of Openings from Certain Viewpoints, Compared for Action Alternatives 2 and 3.

View Point		Visible From View Point (acres)	Alt 2	Alt 3
Mt. Crag	Middleground (M)	**Clearcuts**		
		(43/14b)	3.1	NA
	Background (M)	(43/22b)	1.3	NA
		(44/13a)	3.7	NA
		(44/26a)	1.9	NA
Shelburne Trail	Middleground (M)	**Clearcuts**		
		(44/6a)	4.1	4.1
North Rd. Bridge	Background (M)	**Clearcuts**		
		Any/all stands	0	0

All of the stands proposed for even-aged management would meet the Visual Quality Objectives for all analyzed viewpoints as outlined in the Forest Plan. Harvesting activities within stands 44/6a&b, 44/7, 44/10a, 44/11, 44/17, 44/25 and 44/26a would be visible in the foreground from the Shelburne Trail/Corridor 19.To minimize visual impacts, slash would be removed 50 feet from the road and reserve trees in groupcuts would be strategically placed to reduce the amount of opening visible. Within uneven-aged managed stands, any noticeably damaged small trees would be removed to minimize the visible evidence of harvesting.

Roadwork associated with the dual use widening and reconstruction of FR 95 will change the present trail-like appearance of sections of the road to that of a gravel surface forest road free of vegetation and surface water.

3.4.3 Cumulative Effects on Visual Quality Objectives

Evidence of previous harvesting is visible across the landscape, both on the National Forest and on lands in other ownership. Past actions most likely resulted from natural disturbances, timber management, landing clearing for residential housing development and road construction. Within the Analysis Area, no harvesting has occurred within the last ten years. Along with the action alternatives, the cumulative visual effects would be a blend of new openings and areas of differing height and coloration, producing a mosaic effect of textures upon the landscape. Because these textures are seen from Mt Crag, a distance of over 2.5 miles, they tend to blend in and the various silvicultural treatments are less visually apparent.

Both of the action alternatives propose some level of clearcutting and would meet the Forest Plan standards and guidelines for visual quality for all viewpoints. Alternative 2 produces the greatest amount of visible openings upon the landscape as seen from Mt. Crag (10 aces) compared to Alternative 3 (0 acres). These additional openings create a greater diversity of textures and visual impact across the analysis area. No additional harvesting is planned in this area for the next ten years, so cumulative impacts to visual resources are expected to be well within the scope of those described in the Forest Plan. No effects are expected from the future watershed project.

3.5 Roadless/Wilderness Character

Issues Related to Roadless/Wilderness

- No harvesting in roadless area until roadless rule has been settled or Forest Plan has been revised

3.5.1 Affected Environment for Roadless/Wilderness Character

As part of the Forest Planning process, the White Mountain National Forest is required by law to conduct an inventory of lands within the National Forest that qualify as “roadless”, and then to evaluate and consider these lands for recommendation as potential Wilderness areas. Proposed stands west of East Brook and south of the Connor Brook Road fall within the 2004 Wild River Roadless Area Inventory.

1986 Forest Plan Roadless Areas

For the 1986 Forest Plan, 17 Roadless Areas totaling about 239,000 acres, excluding wilderness areas were inventoried on the White Mountain National Forest. From that inventory, the Forest Service recommended, and Congress approved the 12,000-acre Caribou-Speckled Wilderness. The White Mountain National Forest currently has 5 congressionally-designated Wilderness areas, totaling 114,000 acres. The remaining 16 Roadless Areas inventoried in the 1986 Forest Plan were assigned to a variety of Management Areas. One of these Roadless Areas, Wild

River, is adjacent to the Connor Brook Area but is not directly impacted by any of the proposed harvest units. Maps of these Roadless Areas are available in the Project Planning Record.

In January 2001, President Clinton approved new rules for managing Roadless Areas. Referred to as the Roadless Area Conservation Rule, this new direction would have applied to the 16 Roadless Areas inventoried in the 1986 Forest Plan, providing greater protection of these Roadless Areas than some of the Management Area prescriptions assigned by 1986 Forest Plan. To date, the Rule has not been formally implemented. However, the Forest Service is following temporary direction by requiring that the Chief of the Forest Service approve any new road construction or timber harvest within the boundaries of the Roadless Areas covered by the 2001 Roadless Area Conservation Rule. The Connor Brook project would not propose any road construction or timber harvesting within the Roadless Area covered by the Roadless Area Conservation Rule.

Forest Plan Revision – New Roadless Area Inventory (2004)

For the ongoing Forest Plan Revision, the White Mountain National Forest has completed a new Roadless Area Inventory. This inventory reconsiders all lands on the National Forest for their Roadless Area potential, accounting for new land acquisitions, changes to the landscape since the last Forest Plan, and improved computer technology for evaluating areas. The new inventory includes 17 Roadless Areas totaling nearly 409,000 acres (excluding 114,000 acres of Wilderness). The new inventory expands the Wild River Roadless Area and a portion of the Connor Brook Project Area falls within its boundaries, including all stands to the west and south of the Corridor 19 snowmobile trail. A map of the new Roadless Area Inventory, including the Wild River Roadless Area, is available in the Project Planning Record.

The nearest congressionally-designated Wilderness Area to the Connor Brook Project Area is the Caribou-Speckled Wilderness which is located approximately 3.6 miles from the nearest proposed harvest unit (45/9a).

Roadless Characteristics

Roadless characteristics are quantitative and objective, and they determine whether an area may be considered for recommendation as Wilderness. The Forest Plan Revision Roadless Area Inventory applied roadless criteria to the White Mountain National Forest to determine which areas qualified for consideration for recommendation as Wilderness. Since a portion of the Connor Brook Project Area falls within the boundaries of the 2004 Inventoried Wild River Roadless Area, the effects of the project proposal on the roadless characteristics of this area will be analyzed. Not all of the roadless characteristics will be evaluated, since only some of these characteristics are affected by the Connor Brook project proposal.

The following roadless characteristics will be analyzed:

- To be roadless, an area must have less than a 0.50 mile (½-mile) of improved roads per 1,000 acres of National Forest.
- To be roadless, the percentage of an area that has had a regeneration timber harvest (clear cuts, seed tree cuts and shelterwood cuts) within the past 10 years must be less than 20%.
- To be roadless, the percentage of an area that has non-native tree plantations or permanent wildlife openings must be less than 15%.

- To be roadless, an area should have a core of solitude of at least 2,500 contiguous NF acres that is not impacted by motorized influences (and meets primitive or semi-primitive non-motorized recreation opportunity guidelines).

The Forest Plan Revision Roadless Area Inventory has determined that the Wild River Roadless Area includes 71,387 NF acres, with 14.4 miles of improved roads (a density of 0.20 mile per 1,000 NF acres). **The Analysis Area for direct, indirect and cumulative effects on roadless characteristics** is the Forest Plan Revision Wild River Roadless Area. The analysis considers the existing characteristics of the Wild River Roadless Area (as detailed in the Roadless Area Inventory), and how the proposed project, and any projects in the foreseeable future, may affect these characteristics. Since the Forest Plan Revision will make a determination on future management of the Wild River Roadless Area, the foreseeable future will include any potential activities between now and the implementation of the revised Forest Plan, anticipated to be mid/late 2005. Vegetation management is allowed within the proposed project area under all Alternatives of the revised plan

Wilderness Characteristics

Once an area has qualified as Roadless, it is evaluated in the Forest Plan Revision process to determine if it has characteristics consistent with a Wilderness. These Wilderness characteristics describe those attributes of an area that may or may not recommend it as Wilderness. The effects of the project proposal on the Wilderness characteristics of the Wild River Roadless Area will be analyzed. Not all of the Wilderness characteristics will be evaluated, since only some are affected by the Connor Brook project proposal.

The following Wilderness characteristics will be analyzed:

- Solitude, or the degree to which an area provides visitors with a Wilderness experience. Analysis will consider short-term effects and any reduction in the core area of solitude as a result of the project proposal.
- Degree of Disturbance, or the degree to which an area's natural appearance may be altered. Analysis will consider the effects of timber harvest and road restoration or construction.

Analysis of Wilderness characteristics may involve some of the same criteria as the roadless characteristics. However, a proposed project may not affect an area's designation as Roadless (because it would not change the quantitative criteria to a point the area would no longer qualify as Roadless), but it may still affect an area's Wilderness characteristics (because it may affect some change in solitude or degree of disturbance).

Consideration for Wilderness

The Forest Plan Revision process will determine the availability of a Roadless Area for consideration as a potential Wilderness. While the Connor Brook project may affect roadless and/or Wilderness characteristics of the Roadless Area, it does not propose any activities that would make the Wild River Roadless Area unavailable for consideration as potential Wilderness in the Forest Plan Revision.

The Analysis Area for direct, indirect and cumulative effects on Wilderness characteristics is the same as for roadless characteristics. The time frame for cumulative effects will be the same, as well.

3.5.2 Direct and Indirect Effects on Roadless/Wilderness Character

Alternative 1: No Action

Alternative 1 proposes no timber harvest or road restoration or construction, and it would have no effect on the roadless or Wilderness characteristics of the Analysis Area.

Action Alternatives 2 and 3

The 1986 Forest Plan permits up to 343 acres of regeneration harvest and 103 acres of wildlife openings on MA 3.1 lands within the Analysis Area. To qualify as a Roadless Area, the criteria permit up to 14,277 acres of regeneration harvest at any given time and 10,708 acres of wildlife openings within the Analysis Area, well beyond the scope of what is permitted by the existing Forest Plan. Within the Analysis Area, Alternative 2 proposes 58 acres of regeneration harvest and 0 acres of new wildlife openings; Alternative 3 proposes 0 acres of regeneration harvest and 0 acres of new wildlife openings. When added to the existing acres of regeneration harvest and wildlife openings identified in the Roadless Area Inventory for the Wild River Roadless Area, the acres proposed in each of the Action Alternatives fall well under what is permitted by the roadless criteria (Table 11).

The roadless criteria would permit up to 35.7 miles of improved roads in the 71,387-acre Wild River Roadless Area. The inventory identifies 10.05 miles of existing improved roads. Alternative 2 does not propose any additional improved road and will remain well below the amount permitted by the roadless criteria (Table 11). Alternative 3 does not propose any additional improved roads in the Analysis Area, resulting in no changes in the core acres meeting the criteria for solitude.

The Action Alternatives would have limited effect on the roadless characteristics of the Analysis Area, and no effect on its eligibility as a Roadless Area. The Action Alternatives will add to the degree of disturbance in the Analysis Area, but they will not result in an irreversible or irretrievable change in the condition of the land or its capability as potential Wilderness.

3.5.3 Cumulative Effects on Roadless/Wilderness Character

There are no foreseeable harvest proposals that would have an effect on the eligibility of the Analysis Area as a Roadless Area, or result in an irreversible or irretrievable change in the condition of the land or its capability as potential Wilderness. Within the Analysis Area for Cumulative Effects, no vegetation management has occurred within the past ten years. Present Action Alternatives, other vegetation management projects (Chandler Round, Peabody) in the planning stages and the future watershed project meet the minimum criteria in Table 6 for the Analysis Area to remain eligible as a Roadless Area. As seen in Table 11, Chandler Round and Peabody Vegetation Management Projects add few Regeneration and Permanent Wildlife Opening acres while contributing zero miles of Improved Roads and no acres of Solitude. No future harvests are proposed for the next ten years within the Analysis Area for Cumulative

Effects. The degree of disturbance for all cumulative impacts is minimal and does not reduce the core area of solitude, thus preserving the potential for Wilderness.

Table 11. Summary of Cumulative Effects on Draft Wild River Roadless Area

Roadless Characteristics	Draft Wild River Roadless Area		
Total Acres	**71,387**		
Regeneration Acres			
Acres Allowed for area to Remain Roadless (20%)	14,277		
Acres Allowed by Current Forest Plan [1]	1496		
Inventoried Regeneration Acres	77		
Acres Added by Connor Brook Proposal	**Alt 1**	**Alt 2**	**Alt 3**
	0	58	0
Acres Added by Foreseeable Future Actions*	112		
Improved Roads			
Miles Allowed to Remain Roadless	35.7		
Inventoried Miles	10.05		
Miles Added by Connor Brook Proposal	**Alt 1**	**Alt 2**	**Alt 3**
	0	0	0
Miles Added by Foreseeable Future Actions	0		
Permanent Wildlife Openings			
Acres Allowed for area to Remain Roadless (15%)	10,708		
Acres Allowed by Current Forest Plan [2]	449		
Inventoried Permanent Wildlife Opening Acres	35		
Acres Added by Connor Brook Proposal	**Alt 1**	**Alt 2**	**Alt 3**
	0	0	0
Acres Added by Foreseeable Future Actions**	3		
Solitude			
Acres Allowed to Remain Roadless	2,500		
Inventoried Core Acres of Solitude	54,982		
Core Acres after Connor Brook Proposal (All Alternatives)	54,982		
Core Acres after Foreseeable Future Actions	54,982		

[1] Equals maximum allowed under current Forest Plan (10% of MA 3.1).
[2] Equals maximum allowed under current Forest Plan (3% of MA 3.1).
* 55ac Chandler Round, 57ac Peabody Vegetation Management Projects.
** 3ac Peabody Vegetation Management Project.

3.6 Soils

No Issues Related to Soils

3.6.1 Soil Erosion

3.6.1.1 Affected Environment for Soil Erosion

The Connor Brook Analysis Area has soils common to the White Mountain National Forest. At elevations below 2,500 feet, which is the case in this proposed sale, the soils are mostly deep, well and moderately well drained, fine sandy loam tills on 10-25% slopes. Along Connor Brook there are moderately well drained fine sandy loams overlying dense hardpan, intermingled with excessively drained outwash sands.

This analysis area and the proposed action are too low on the landscape to have dry debris slides. This means there is no potential for mass movement of shallow, gravelly soils. However, it is low enough on the landscape to potentially have deep soil slumps. While there are some steep, potential slump banks along Connor Brook, field and photo evidence indicate none of these areas are located where this action is proposed. There are also no harvest areas, roads or skid trails where the soil is shallow to ledge. In summary, therefore, surface soil erosion on deep soils is the only soil physical hazard for the Proposed Connor Brook Sale.

Surface soil erosion is always a concern, especially related to initial road construction and skid trails. Overall, soil erosion in eastern forests is not considered a problem when Best Management Practices (BMPs) are applied in a timely way (Martin and Hornbeck 1994). Field monitoring on the White Mountain National Forest supports this conclusion (USDA Forest Service White Mountain Monitoring Report 2000). The soils in this area are rated moderate to high surface soil erosion hazard relative to other soils on the White Mountain National Forest (USDA, 1986a, LRMP). This rating is without a forest cover or any mitigation measures.

Within the analysis area, roads and skid trails are the main concern for soil erosion because they may expose mineral soil (Patric 1976). The act of cutting trees is not a source of soil erosion because it does not expose mineral soil (Stone et al 1978). In this area, the primary roads are already constructed, and have been in place for years. They are maintained to Forest Plan standards to prevent concentration of surface water and therefore avoid surface soil erosion. This includes being graded, ditched and culverts maintained to safely disperse surface water. The period of greatest soil erosion hazard is within the first year of road construction (Stone et al 1978). Previously used haul roads and skid trails in the project area have generally re-vegetated or are becoming thick with saplings and have water-bars in place. There is generally no evidence of surface soil erosion, though some limited, site-specific soil erosion was found on a few old skid trails.

Existing log landings from previous sale activity are well located and stabilized, and do not show signs of soil erosion based on field inspection. They are not considered a significant source of soil erosion (Stone et al 1978), but may sometimes present concerns about soil compaction.

However, research reveals that soil bulk density of log landings returns to pre-harvest densities two to three years following harvest (Donnelly et al 1991). At no time is the oxygen content of the soil unable to support plant growth, which is why these areas are easily re-vegetated following use.

The Analysis Area for direct and indirect effects on soil erosion is the National Forest land within the project area designated as MA 3.1 in the Connor Brook and East Brook Watersheds. This is because it is within these watersheds that previous soil-disturbing activities may have taken place, and within which the proposed action is located.

3.6.1.2 Direct & Indirect Effects on Soil Erosion

Alternative 1: No Action

The direct effects for Alternative 1 may be localized soil erosion related to on-going maintenance of permanent, all season Forest roads. There may be some limited, site-specific surface soil erosion from maintenance of snowmobile trails. However, both maintenance actions prevent potentially more serious soil erosion events.

In the absence of activities such as timber harvesting, no surface soil erosion is expected with this alternative because there is no road construction, or re-opening, and no re-use of skid trails.

No indirect effects are expected from this Alternative. See water quality discussion for indirect effects.

Alternative 2: Modified Proposed Action

No accelerated soil erosion is expected on the Connor Brook Road (FR 95) because it is constructed to a standard that properly manages surface water. Ditches and culverts are adequate, cut-banks are stabilized, and maintenance of all such facilities will occur before and during the life of sale activity.

Most of the skidding and harvesting in the Proposed Sale will occur in the summer and fall seasons, other than during periods of extended rainfall. This is primarily to avoid impacts to snowmobile use of the Connor Brook Road, which is a main corridor snowmobile travel route. Summer and fall operations will expose mineral soil on the main skid trails, and it is likely there will be site specific locations of surface soil erosion. However, this area was previously harvested during the summer and fall about twenty years ago, and there is little or no evidence of soil erosion. In addition, careful location and management of skid trails, taking advantage of breaks in terrain and avoiding steep slopes will largely minimize or avoid soil erosion. In addition, closeout of skid trails in accord with Forest Plan standards and guidelines will also minimize soil erosion.

Stands 43/31, 44/13a, 45/4, 45/9a and 45/9b will be harvested in the winter under frozen ground conditions. On-site examination showed that these stands included moderately well to poorly drained soils with surface seeps, indicating that only frozen soil harvesting was appropriate. With frozen soil harvest, proper skid trail location, and careful closeout at the completion of harvesting, no surface soil erosion is likely to occur.

Four log landings are identified for use during harvest operations. The sites were chosen for gentle terrain, better drained soils, and avoiding impacts to wetlands or streams. Truck traffic and skidder operation will churn the soil surface and expose mineral soil leading to on-site soil erosion within the boundary of the log yard. However, the combination of careful site selection and management of the log yard during use will avoid any long-term soil erosion impacts. At the time of sale closeout, the log landings will be graded and stabilized to prevent post sale soil erosion events.

Prescribed under-burning of one timber stand will occur either in late spring when the snow cover has melted or in late summer/early fall when temperatures have cooled. While some surface soil organic matter may be lost, actual experience does not indicate that prescribed burning affects rainfall infiltration rates. This is because most of the site continues to remain covered by organic matter and mineral soil aggregation is not changed. Soil nitrogen would be lost when organic matter burns, however, little of the organic matter is actually lost due to the low intensity of the fire and atmospheric deposition is contributing nitrogen to the soil.

Indirect effects such as sedimentation of streams are the most likely indirect effect from road construction, use or skidding. See Water Quality (Section 3.7.3) for discussion.

Alternative 3: Excluded Roadless Area Action

This alternative deletes all harvest areas and skid trails south and west of the Corridor 19 snowmobile route. This eliminates more than one-half of the proposed timber sale harvest units, including most of those stands assigned to winter harvest to minimize soil erosion hazard.

While the site magnitude of potential soil erosion impacts is substantially less than Alternative 2 because fewer acres are subject to skidder operation, the intensity of site specific impacts are similar. There will be exposure of mineral soil due to skidder operations, and use of log landings. There may be soil erosion along FR 95, though maintenance of the roadway largely eliminates this. While most of the terrain in the Proposed Sale is only moderately steep, deleting stands south of FR 95 and west of the snowmobile trail does eliminate some steeper terrain. Prescribed fire impacts are unchanged from Alternative 2. Overall, therefore, there is less likelihood of surface soil erosion, though in no case are any areas eliminated from harvest because of a soil erosion concern.

3.6.1.3 Cumulative Effects on Soil Erosion

The Analysis Area for cumulative effects of soil erosion is the Connor Brook and East Brook watersheds (Water Quality Section) which represents 10,100 acres of land. This area was chosen because it encompasses past and proposed activities.

Two previous timber sales have occurred in these watersheds in recent times, including even and uneven aged harvesting of hardwood and softwood sites, and truck and skidder use. No future timber harvests or other projects are planned in the foreseeable future. The time period for soil erosion cumulative effects is the last 40 years and 10 years beyond this proposed action. These periods were chosen to incorporate known past activities, and time for the proposed activities to occur and be completed.

Cumulative soil erosion impacts within the Analysis Area are generated primarily from past timber harvesting on public lands and road maintenance. Past harvest activities in the Analysis Area have contributed little to soil erosion due to the well and moderately well drained nature of the soils, natural re-vegetation of the road surfaces and use of Forest Plan Standards and Guidelines and Best Management Practices such as installation of water bars and road maintenance.

Cumulative effects from Alternative 1 is small amounts of site specific soil erosion because care was exercised in the construction and maintenance of FR 95, the location of skid roads, and the magnitude of harvest has been relatively low. Alternative 2 potentially contributes to the most cumulative soil erosion because it affects the most acres and volume of harvest; however, deep well drained soil, proper maintenance of FR 95, careful location of skid roads and harvesting still minimizes soil erosion. Cumulative impacts of Alternative 3 are potentially less than Alternative 2, but in any case, the soil erosion cumulative effects remains low for the same reasons as Alternative 2.

In summary, there would be some cumulative soil erosion impacts from the proposed project, but overall the cumulative impacts are likely to be site specific, limited in magnitude and duration, and well within the scope of the effects anticipated and analyzed in the FEIS for the 1986 Forest Plan.

3.6.2 Soil Calcium

3.6.2.1 Affected Environment for Soil Calcium

Research at the Hubbard Brook Experimental Forest on the White Mountain National Forest indicates there is a concern about soil calcium loss from atmospheric deposition and timber harvest (Federer et al 1989). This may affect long-term forest productivity, health and composition. Unlike the proposed action in this analysis, this study focused on intense (clear-cut, whole tree harvest) harvest applied at short intervals (40 years), not longer rotation forestry using bole-only harvest. Therefore, the magnitude of concern here is smaller. The 1998 National Acid Precipitation Assessment Program Report (NAPAP 1998) indicates that eastern hardwood ecosystems are not considered sensitive ecosystems, and that soil sensitivity is variable (NAPAP 1998). Sensitivity here means the likelihood of calcium loss from acidification of soil.

In the past, soil erosion was the principal concern affecting forest soil productivity. The issue was loss of organic matter that harbors nutrients and helps maintain soil aeration. However, it has been found that soil organic matter is not lost from harvest sites, even those clear-cut, or those where all the tree boles, tops and limbs are removed (Johnson et al 1991; Johnson et al 1997). Instead, it is re-distributed in the upper mineral soil layers during harvesting. Also, it is re-supplied more quickly by root decay than it is lost by erosion or respiration.

Soils within the Project Area are deep and moderately or well drained fine sandy loam tills. There are no soils shallow to ledge, where soil productivity might be an issue due to limited soil volume. In general, soil calcium concentrations are at moderate amounts in this northern portion

of the Forest. This is due to the mineralogy of the bedrock that contributed to the formation of these soils. In contrast, soils in Bartlett Experimental Forest in the southeastern part of the White Mountain National Forest have low calcium concentrations. Despite low concentrations, however, forest measurements since 1931 (up to 1997) at Bartlett do not indicate a change in forest biomass accumulation trends (growth) over this long period of time (Nuengsigkapian, 1998). The same result was found when the study was expanded forestwide (Smith et al 2002). There is also no evidence of change in forest composition over time at Bartlett (Leak 1992), the idea being that changes in soil nutrition would lead to different mixes in forest composition. Forest health assessment on the White Mountain National Forest was part of a regional study, and it showed only limited dieback of forest canopy (Hallett et al. 2000). Dieback means some twigs or foliage has died or is discolored, some of which is not atypical in a maturing forest. A study is currently underway to assess forest health in northern hardwoods across a range of calcium concentrations on the White Mountain National Forest. Preliminary data indicates that of the 2000+ trees evaluated for forest vigor, the vast majority is vigorous and lies within this healthy category.

Past harvest (or other land uses) may be a cumulative factor in soil calcium nutrition. Early land use records indicate timber harvest in this vicinity was relatively heavy in the early 1900's (Goodale 1999). No agricultural uses were made of this land. Since the early 1900's, there has been conventional, bole-only forest harvesting in this area. This means the tops and limbs were left in the woods. Tree tops and limbs account for about 35% of the calcium that resides in a northern hardwood forest. As noted, whole-tree harvest is not proposed in the Connor Brook Sale. Where clear-cutting previously occurred in this vicinity, as elsewhere across the White Mountain National Forest, regenerated timber stands now show adequate stocking. This means there were sufficient nutrients (and other resources) to support a new stand.

Soil calcium in the Project Area may have been affected by atmospheric deposition and early timber harvest practices. Based on research at Hubbard Brook Experimental Forest, it is estimated that 5% of the total soil calcium may have been lost since 1950 when acid rain began in earnest (Federer et al 1989). Using updated information that includes mineral weathering, which was not part of the original calculations, this number can be reduced to about 2% (Fay 2003; Likens et al 1998). Land use records and timber stand age and composition suggest Connor Brook area was probably harvested in the early part of the 1900s, and that the stands were heavily harvested (Goodale 1999). This would translate into an estimated 1-2% loss of soil calcium from the removal of forest products (Fay 1993). It is estimated, therefore, that about 3-4% of the total soil calcium may have been lost due to atmospheric deposition and timber harvest during approximately the past 50 years. Research continues into soil calcium, and work on calcium oxalate and apatite feldspar is likely to diminish the magnitude of impact because these are currently unaccounted for sources of soil calcium. In fact, it is believed that calcium oxalate is released from the soil after a clear-cut because temporarily more soil conditions makes the calcium soluble and available for plant use. It is generally agreed that atmospheric deposition, not timber harvest, is the predominant causative factor with respect to potential soil calcium loss (Solomon and Driscoll 2003).

Finally, Connor Brook is part of a timber sale program for the entire Forest that has been in the range of 20-24 MMBF per year. This is about 1/3 of the biological potential of the current suitable timberland, meaning that current growth far exceeds harvest, and that overall, harvest interruption of the calcium cycle is relatively infrequent and widely spread. Second, our rotation lengths where clear-cutting is involved in northern hardwoods is approximately 120-years, which

is not only consistent with silvicultural guides, but also, does not raise us to the level of concern sometimes expressed when rotation lengths are short, such as 40-years (Federer et al., 1989). And finally, there is no proposal, in this case, to practice whole-tree harvest; therefore, from the outset, approximately 1/3 of the calcium that might be removed during a timber sale remains on site for re-cycling into the ecosystem.

The Analysis area for direct, indirect and cumulative effects to soil calcium is the location of the actual harvest activities since site specific impacts related to soil or forest productivity are not likely to extend further.

3.6.2.2 Direct and Indirect Impacts to Soil Calcium

Alternative 1: No Action

Because timber harvest would not occur in Alternative 1, there would be no direct impact on soil calcium from harvest activity. Other than the ongoing cumulative effects of atmospheric deposition, the current supply of soil calcium would remain available to buffer the impacts of acid deposition. Research findings based on detailed modeling at Hubbard Brook indicate that soil calcium recovery from past harvest and acid deposition is possible (Likens and Bormann 1995).

Indirectly, retaining soil calcium may help to minimize possible impacts to forest productivity, species composition, or health that might result from future timber harvest or acid deposition. The consequence, based on current research, is that these forest qualities will likely remain unchanged (USDA Forest Service White Mountain Monitoring Report 2000, pp. 43-50). The only evidence of negative indirect effects in northern hardwoods is limited dieback of branches on trees within the sugar maple decline study sites located on the Forest (Hallett et al. 2000). This may not be directly linked to acid deposition, but the result of other factors, including the maturation of the forest. Some dieback is commonly found in many northern hardwood stands. Until the mechanisms are well known, it is very difficult to attribute changes in forest health to any single factor. In fact, changes in forest health are due to multiple factors, including not only possibly soil calcium, but also, either drought or repeated insect infestations.

Action Alternatives 2 and 3

The harvest and removal of forest products takes away calcium that would otherwise be recycled to the forest floor. Clear-cut harvest by conventional bole-only harvest removes approximately 187 Kg/ha of calcium that equates to approximately 2% of the total soil calcium supply. Thinnings, single-tree selection and group cuts removes 44 Kg/ha that equates to less than 1% of the total calcium supply in the soil. Estimated losses from softwood harvesting are somewhat less than from hardwoods. The acres of clear-cut and single-tree, thinning or group cuts at the Connor Brook Sale is shown below in Table 12. This table shows that clear-cutting is a small portion of either action alternative. It also shows the possible magnitude of impact when the percentages mentioned above are related to the acres treated. Alternative 2, therefore, has a greater estimated impact on soil calcium than Alternative 3, driven by differences in acres and methods of harvest.

Table 12. Acres of Clearcuts or Other Harvest Activity by Alt.

Method	Alternative 1 (Acres)	Alternative 2 (Acres)	Alternative 3 (Acres)
Clear-cut	0	70	12
Other	0	451	284

As a practical matter, indirect impacts are the same as the No Action Alternative. This is because soil acidification is driven largely by the impacts of acid deposition, not the harvesting of trees (Soloman et al 2003). Therefore, while there may be a subtle change in forest productivity, health or forest species composition, it is probably indistinguishable given the intensity and frequency of harvest for the Connor Brook area.

3.6.2.3 Cumulative Effects on Soil Calcium

The time span for this analysis is from early harvesting at the beginning of the 20th century to 10 years into the future, which is the reasonable planning horizon for public and private entities. Early harvesting is considered because land use history affects soil nutrients, including calcium. Future harvesting and atmospheric deposition are considered for the same reason. The Project Area is composed of second-growth hardwood forest, regenerated from around 1900. The effects of the prescribed burn in stand 44/9 are minimal.

Alternative 1: No Action

Past harvest and acid deposition up to the time of the proposed sale was estimated to lead to approximately a 3-4% loss of soil calcium over a 50 year period. This estimate is based on small watershed mass balance studies at the Hubbard Brook Experimental Forest, which is not a direct measurement of change in soil calcium. Presuming a similar rate of acid deposition over the next 10 years, which actually may become lower due the impacts of the Clean Air Act, there would be an additional estimated loss of 1.6%. Therefore, the total estimated cumulative loss over the period of this cumulative effects analysis is 4.6- 5.6%.

Action Alternatives 2 and 3

The cumulative effect of calcium depletion on the stands proposed for harvest includes an estimated 2% (land use history) + 2% (acid deposition up to 2004) + 1-2% (proposed harvest) + 1.6% (future acid deposition) = 6.6-7.6% on those acres prescribed for clearcuts or seed tree cuts. In those cases when other methods are applied (e.g. single-tree, thinning, small groups), the proposed harvest value would change from 2% to <1%, reducing the cumulative calcium depletion to <5.6-6.6%.

When contemplating these estimated cumulative impacts, it is significant to bear in mind that direct measurement of exchangeable soil calcium at Hubbard Brook Experimental Forest (Johnson et al 1997) has shown no change eight years after a whole-tree clearcut. In addition, a personal communication with the principal investigator indicates the same is true after 15 years, based on unpublished data (Johnson, 2004). Whole-tree clear-cut is considered the most intense

harvest practice. It is believed by some that small watershed studies generally overestimate losses of base cations (Adams et al 2000).

Furthermore, ongoing studies are likely to reduce the magnitude of these estimates. In particular, current research on calcium oxalate, a previously un-quantified source of calcium, will likely further reduce the estimated impacts. Also, studies of feldspar appetite as an additional source of calcium may have a similar impact. It appears, therefore, that these estimates are likely to be overestimates, and that they are not supported by direct measurement of the soil.

The cumulative effect on forest productivity, forest health and forest species composition is the same as those disclosed under indirect effects for Alternative 1. That is to say, no change is expected in the trend of biomass accumulation based on related studies at the Bartlett Experimental Forest (Nuengsigkapian, 1998), and forest-wide (Smith et al 2002). No change in species composition is expected based on long-term studies at the Bartlett Experimental Forest (Leak 1992). Forest health plots as part of a regional study indicate only limited dieback at the few plots on the White Mountain National Forest (Hallett et al 2000). This is supported by ongoing study of forest health plots across a range of calcium concentrations on the Forest (Fay 2003). This same study is also not revealing any changes in forest composition on northern hardwood sites; namely, sugar maple and beech are the most common species on these 80-120 year old stands, which is what would be expected on rich hardwood soils with stands of this age.

3.7 Water

No Issues Related to Water

3.7.1 Wild and Scenic Rivers

Connor Brook and East Brook are the two largest tributaries within the project area and are not on the list of inventory rivers on the White Mountain National Forest that meet the minimum criteria for the Wild and Scenic Rivers Act.

3.7.2 Watershed

3.7.2.1 Affected Environment for Watershed

Connor Brook Vegetative Management Project is located in the Connor Brook and East Brook watersheds (Figure 1). These watersheds are located in the headwaters of the Androscoggin River and were delineated according to 20-foot topographic contour lines (Weddle, 2004). Their total acreage is approximately 6,600, and they encompass the area that will be analyzed for direct, indirect, and cumulative effects. This scale watershed was selected because it includes all the headwaters of the streams which flow through the proposed units, and at this scale the effects of multiple uses within the watershed could become additive and result in cumulative effects. Future projects in the Connor Brook project area include an assessment of sources of instability in the Connor Brook watershed, as well as treatments of these unstable reaches. Sources of

instability appear to occur in the headwaters where currently no timber harvesting is proposed. Actions proposed in the next 5-10 years would reduce the intensity of spring run-off and precipitation run-off events in the watershed.

The watershed of Connor Brook contains approximately 3,100 acres. It is aligned southwest to northeast with the outlet to the north. Elevations in the watershed range from 700 to 2,966 feet. As seen in Figure 1, one unnamed intermittent channel and two unnamed perennial channels enter Connor Brook from the north. One unnamed perennial channel and two unnamed intermittent channels enter Connor Brook from the south. Small, unmapped intermittent and ephemeral channels also exist in the watershed. The northern border of the watershed is located where Connor Brook flows into the Androscoggin River. The watershed is bordered on the northwest by Stock Farm Mountain and by Howe Peak to the south. The Connor Brook watershed is a subwatershed of the 12-digit hydrologic unit code (HUC) Shelburne Tributaries watershed (010400020104).

East Brook watershed contains approximately 3,500 acres. It is aligned south to north with the outlet to the north. Elevations in the watershed range from 700 to 3,735 feet. Clement Brook, one unnamed perennial, and one unnamed intermittent channel enter East Brook from the west. Small, unmapped intermittent and ephemeral channels also exist in the watershed. The northern border of the watershed is located where East Brook flows into the Androscoggin River. To the south, the watershed is bordered by Howe Peak and Shelburne Moriah Mountain. The East Brook watershed is a subwatershed of the 12-digit HUC Shelburne Tributaries watershed (010400020104).

Historic logging occurred within the Connor Brook and East Brook watersheds around the turn of the century. Trees were logged from riparian areas and woody material was removed from streams. Subsequent flooding and scour added to these effects and resulted in portions of the watersheds with less than potential levels of woody material and loss of diverse channel and floodplain characteristics. Although there is no specific knowledge of fire occurring in these watersheds, wildfire following extensive harvesting occurred throughout the White Mountains, further reducing vegetative material, which is integral in providing channel stability.

In 1969, three large 100-acre clearcuts were harvested in the Connor Brook watershed. These clearcuts likely increased water quantity in the streams. The increased water quantity, combined with no large woody debris in streams to dissipate increased flows, may have contributed to the erosion of the stream bed and banks. A large flood in 1995 may have led to further instability in this channel. Although the roots of live trees on the stream banks are currently contributing to the protection of the stream banks, the Connor Brook watershed has not fully recovered from the impacts of these large clearcuts. Some reaches of the stream are overwidened and large woody debris in the stream channel has not returned to the levels that were likely prior to logging.

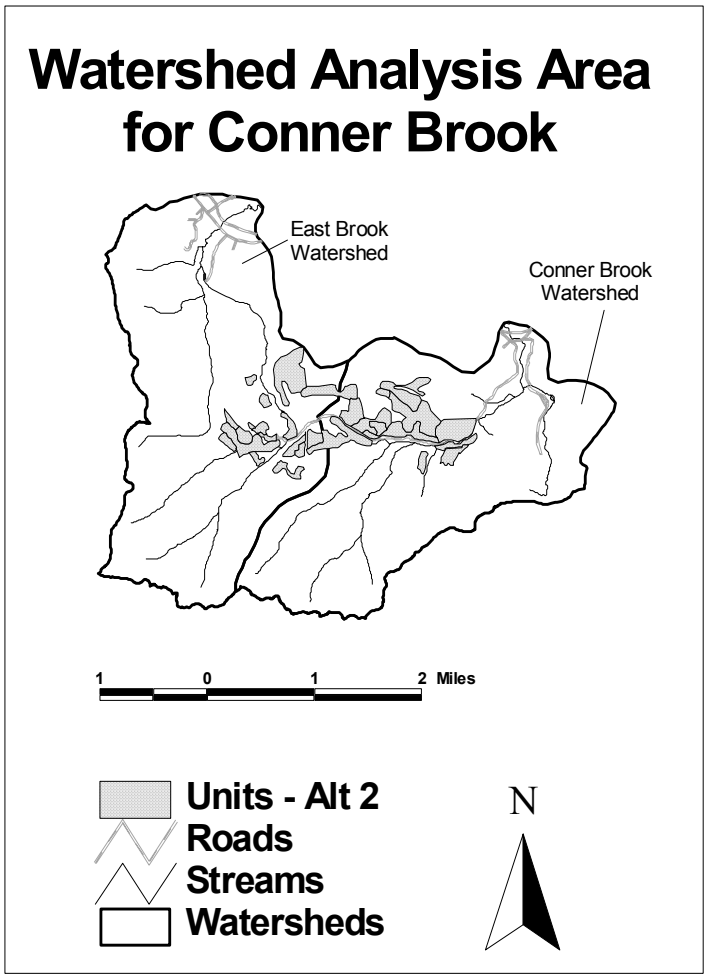


Figure 1. Watershed Analysis Area for Direct, Indirect, and Cumulative Effects.

3.7.2.2 Direct and Indirect Effects on Watershed Condition

Alternative 1: No Action

There would be no new direct or indirect effects on channel stability from implementation of Alternative 1 (No Action). Streams and riparian areas would continue to function much in the same way as present. Forest Plan direction, Standards & Guidelines, and Best Management Practices would continue throughout the project area. Current and on-going management activities would continue, but no new federal management activities would be initiated.

Action Alternatives 2 and 3

The extent of harvesting and prescribed fire in a watershed can affect the water quantity in a stream. If increases in water quantity are great enough there is the potential for these increases to affect the stability of the stream channel. The ability of increased water quantity to affect channel stability is determined both by the amount of water quantity increase and the current stream stability. The riparian classification indicates the stability of a stream and thus can be

used to determine if the stream can withstand any predicted changes in water quantity. Riparian classifications in the two watersheds indicate 1.4 miles of low gradient streams that are more susceptible to increases in flow. These streams would rely heavily on riparian vegetation to protect stream banks. Research has indicated that trees removed from a stream bank are more likely to affect the water quantity of a stream channel than trees removed from a location away from the stream channel. Riparian buffers are therefore effective at both minimizing increases in water quantity and protecting stream banks should any increases occur.

Buffers around streams and riparian areas protect channels from impacts to stream stability by retaining large woody material adjacent to these areas. The buffers become a source for future recruitment of this wood to the streams, providing for intact structural elements on the stream banks of watercourses, and allowing riparian areas to be intact for more effective filtering of runoff. In addition to the mitigations described in Forest Plan Standards and Guidelines, a minimum 25-foot no-cut buffer would be placed around perennial channels for all Action Alternatives. An additional 75-foot partial-cut buffer would require basal areas to be at least 70 square feet. These buffers should be more effective than those required by the current Forest Plan, as the Plan only requires partial-cut, not no-cut buffers. Around intermittent streams, trees that provide stability to the stream banks would be retained as well. Because the mitigations are expected to be implemented and effective regardless of the Action Alternative selected, long-term direct and indirect effects to channel stability are not expected to occur for either of the Action Alternatives, regardless of stream riparian classification. No streams are within the prescribed burn area of stand 44/9. No effects are expected from the roadwork associated with the dual use widening.

3.7.3 Water Quantity

3.7.3.1 Affected Environment for Water Quantity

Water quantity in streams in the proposed project area is directly related to the amount of precipitation that occurs throughout the year. Even though each summer evapotranspiration reduces the soil water content, the rains in the fall usually completely replenish this water. At Hubbard Brook, 62% of the precipitation becomes streamflow (Likens and Bormann, 1995) and most of the rest is lost to evapotranspiration.

Conner Brook watershed has been affected by heavy harvesting in the past. This is particularly apparent along the main stem of Conner Brook, where the bed and banks are unstable in areas. Three large 100-acre clearcuts occurred in this watershed around 1969. These large clearcuts may have caused increased water quantity in the streams, adding to the instability of the channel. Increased water quantities as a result of extensive harvesting tend to return to normal levels within 7-9 years after harvest (Hornbeck, et al., 1997). Therefore, flows in Connor Brook are no longer elevated as a result of the 1969 clearcuts. Over time, as large woody debris enters the stream, the channel will continue to recover and stabilize from these increased flows.

3.7.3.2 Direct and Indirect Effects on Water Quantity

Alternative 1: No Action

There would be no new direct or indirect effects on water quantity from implementation of Alternative 1 (No Action). Streams and riparian areas would continue to function much in the same way as present. Forest Plan direction, Standards & Guidelines, and Best Management Practices would continue throughout the project area. Current and on-going management activities would continue, but no new federal management activities would be initiated.

Action Alternatives 2 and 3

Changes to vegetation can alter evapotranspiration rates which can lead to changes in streamflow. Research at Hubbard Brook indicates that reductions in basal area must approach 25% to obtain measurable responses in annual water yield (Hornbeck et al., 1993). These increases became greatly reduced 3-4 years after timber harvest, and became undetectable 7-9 years after harvest. Peak flows are often increased during the growing season immediately after cutting, but not of an extent to cause flooding. Most of the increase in water yield occurs during periods of low flow (Hornbeck, et al 1997).

The measure for changes in water quantity is the percentage (%) of the basal area removed in each delineated subwatershed of Connor Brook and East Brook. These percentages are based on each unit's current basal areas and their predicted post-harvest basal areas. Where less than a 25% reduction in basal area is determined, no measurable increase in discharge is expected in the channel associated with those watersheds.

The basal area reductions in the East Brook and Connor Brook watersheds did not exceed the 25% threshold for either of the Action Alternatives (Table 13). Riparian types in these tributaries are generally higher gradient and stable. However, there is 1.4 miles of low gradient stream in the watershed that is more susceptible to changes in water quantity. No measurable increase in discharge is expected in the channels associated with either watershed. Therefore, no channel adjustment related to an increase in discharge from the proposed timber harvest is expected at this scale, regardless of the channel riparian classification and type. No effects are expected from the roadwork associated with the dual use widening.

Table 13. Basal Area Removed in Smaller Subwatersheds, by Alternative.

Watershed	Subwatershed	Stream Type	Percent of Basal Area Removed by Proposed Alternative		
			1	2	3
East Brook	Clement Brook	Perennial	0	1	0
	Tributary	Perennial	0	5	0
	Sideslope draining to main stem East Brook	Perennial	0	3	1
Conner Brook	Tributary 1	Perennial	0	7	3
	Tributary 2	Intermittent	0	6	0
	Sideslope draining to main stem Conner Brook	Perennial	0	2	2

Cutting near the stream channel has a larger impact on water quantity than scattering the cutting throughout the watershed (Hornbeck, et al, 1993). As a result, buffer strips play a large role in preventing changes in water quantity. The 25-foot no-cut and 75-foot partial-cut buffers along perennial channels should help minimize the potential for localized increases in water quantity.

Fire also has the potential to increase water quantity. As described above in regards to timber harvest, vegetation removal reduces interception and evapotranspiration, leaving more water in the soil than if vegetation had been undisturbed. If more water is supplied than can infiltrate and be stored in the soil, the excess water becomes overland flow. Overland flow not only has erosive potential (as described in the water quality section of this report), but could increase water quantities in nearby streams. However, research on prescribed fire indicates that successful prescribed burns in forests consume only part of the forest floor fuels. Thus, prescribed fires, such as the one proposed in the Connor Brook Project, have little effect on canopy interception, evapotranspiration, soil water storage, and overland flow (Baker, 1990). Although there may be small, localized effects, it is unlikely that the underburning proposed in Compartment 44, Stand 9 would increase water quantity in the watershed.

3.7.4 Water Quality

3.7.4.1 Affected Environment for Water Quality

The State of New Hampshire designates surface waters in the Connor Brook and East Brook watersheds as Class B. This classification indicates that these waters are considered acceptable for fishing, swimming, and other recreational purposes and, after adequate treatment, for use as water supplies. Surface waters in the watershed are not currently used for municipal purposes. Recreationists who camp in the area use the streams as a water source following treatment. At present, there are no surface waters listed as not meeting water quality standards in the Connor Brook and East Brook watersheds by the state of New Hampshire.

New Hampshire antidegradation provisions apply to all new and increased point and non-point source discharges of pollutants, including all hydrologic modifications and all other activities that would lower water quality or affect the existing surface waters of the State. Under these antidegradation provisions, all waters of the National Forest are designated as "Outstanding Resource Waters" (ORW) and shall be maintained and protected (NHDES, 1999). This designation has higher water quality standards than Class A waters. Some limited point and nonpoint source discharges may be allowed, provided that they are of limited activity that results in no more than temporary and short-term changes in water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORWs. Such temporary and short-term degradation shall only be allowed after *all practical means* of minimizing such degradation are implemented. Best Management Practices (BMPs) as described in this report and other mitigations elsewhere in the EA are 'all practical means' and would be used should an Action Alternative be selected.

Water Chemistry and Temperature

Basic water quality data was collected in the Connor Brook and East Brook watersheds on August 9, 2004. On the main branch of Connor Brook a pH of 6.52 was measured, as well as a temperature of 60.0° F, and a conductivity of 17 µS/cm. On the main branch of East Brook a pH of 6.15 was measured, as well as a temperature of 58.2° F, and a conductivity of 11 µS/cm. More detailed water chemistry has not been conducted in these watersheds. See the Fisheries Report for the status of fisheries in the watersheds and the effects of current water quality on fisheries.

Sediment

Turbidity is a measurement of the clarity of water. On August 9, 2004, turbidity was measured in the Connor Brook and East Brook watersheds. Turbidity standards for Class B waters in the state of New Hampshire require waters not to exceed naturally occurring conditions by more than 10 NTUs (NHDES, 1999). Turbidity was 0.02 NTUs in the main branch East Brook where FR95 crosses the channel. Turbidity was 0.05 NTUs in the main branch of Connor Brook. This measurement was taken just downstream of compartment 44, stand 25. As described in the water quantity section of this report, some sections of Connor Brook have unstable banks. The turbidity measurement was taken downstream of these unstable banks, indicating that during times of low flow the banks were not causing increased turbidities in the watersheds. Research conducted at Hubbard Brook Experimental Forest indicates that when BMPs are adhered to during and after logging, forest harvesting will only cause minor increases in turbidity (Martin and Hornbeck, 1994). However, logging roads are the source of most of the soil lost from non-channel portions of managed forest land in the East (Patric, J.H., 1976). It is likely that increased sediment movement from the roads in the watershed is entering waterbodies in localized areas during runoff events.

In both the Connor Brook and East Brook watersheds, remnants of old skidder trails exist on very steep ground. Some of these steep trails have intercepted water and formed intermittent tributaries. Other skidder trails and roads were built too close to stream channels and have since been washed out. It is unknown when these trails and roads were built, but it was likely during or before the 1969 timber sale, and thus before current Forest Standard and Guidelines were in

effect. The skidder trails and roads which currently have erosion problems would not be used in the proposed Connor Brook Vegetative Management Project. All new skidder trails would meet current Forest Plan Standards and Guidelines in order to minimize new sediment inputs to streams.

3.7.4.2 Direct and Indirect Effects on Water Quality

Alternative 1: No Action

There would be no increased direct or indirect effects on water chemistry, temperature, or sediment from implementation of Alternative 1 (No Action). The current condition would remain. Chemical water quality and temperatures would remain high quality and cold and would not violate water quality standards.

Action Alternatives 2 and 3

Water Chemistry and Temperature

Research has shown that the usual harvest practices, such as those used on the White Mountain National Forest, do not result in large nutrient losses and do not pose a risk to water quality (Brown, 1983).
In addition to BMPs and Forest Plan Standards and Guidelines, the Connor Brook Project is providing additional mitigation measures to further protect the water quality of streams. The mitigations for water chemistry and temperature provide for a 25-foot no-cut buffer on all perennial streams within the project area, as well as a 75-foot partial-cut buffer. In addition, no watershed would be entirely harvested, further reducing the potential for water quality impacts to streams.

Underburning is proposed in Compartment 44, Stand 9 to promote oak regeneration. Potential effects of fire on water quality include increased sediment and turbidity, water temperature, and increased nutrients in streamflow. However, the magnitude of these potential effects after prescribed fire is less than those of wildfires since the prescribed fire is typically of low severity (Landsburg and Tiedemann, 2000). The effects of fire on sediment and turbidity will be discussed below in the section on sediment.

Increased stream water temperature is a potential result of fire. However, the stand proposed for burning is 0.2 miles away from East Brook, the nearest mapped channel. In addition, no tree canopy is proposed for removal during the prescribed fire. It is therefore unlikely that stream water temperatures would increase as a result of the proposed prescribed fire.

Nitrate and nitrite are the primary constituents of concern from forest burning (Landsburg and Tiedemann, 2000). Research has shown that stream nitrate responses for prescribed fire are lower than stream nitrate responses in wildfire. In addition, research shows that unburned buffer strips between the streams and riparian areas and the area proposed for burning could minimize effects of fire on stream chemistry (Landsburg and Tiedemann, 2000). As stated above, the stand proposed for burning in the Connor Brook Project is 0.2 miles from the nearest mapped channel. This large vegetated buffer strip should effectively filter nutrients before they reach a waterbody.

Because the mitigations would be used regardless of the Action Alternative selected, loss of nutrients and changes in water chemistry and temperature related to the harvest of trees and prescribed fire is not expected to deplete nutrient levels in the watersheds or cause water quality standards to be exceeded for any of the Action Alternatives. Water quality is unlikely to vary between alternatives since mitigations would be applied to any selected Action Alternative.

Sediment

Studies have shown that sediment from logging roads is evident during runoff events, even where BMPs are used (Patric, 1980; Likens, et al., 1970; Hornbeck, et al., 1987). This indicates the importance of augmenting BMPs with Forest Plan Standards and Guidelines and site-specific measures to further reduce effects of sedimentation from roads and skid trails associated with timber harvest.

The magnitude of effects caused by sediment transport is related to area of disturbance. These areas which lack vegetation and have disturbed soils become the source for sediment transport. This area can be measured by acres of ground disturbance resulting from skid trails and landings, miles of new road construction, and miles of pre-haul maintenance on existing roads. Table 14 summarizes these measures for comparison by alternative. Of the Action Alternatives, Alternative 3 disturbs the fewest acres (14.5 acres), and Alternative 2 disturbs the most (25 acres).

Table 14. Summary of Water Quality Measures: Acres of Ground Disturbance from Landings, Skid Trails, Road Construction, and Pre-Haul Maintenance.

Activity	Alt 1	Alt 2	Alt 3
Acres of landings*	0	2	1.5
Roads Construction (miles/acres)	0/0	0/0	0/0
Pre-Haul Road Maintenance (miles/acres)**	0/0	2.1/5	1.7/4
Skid trails (miles/acres)***	0	7.4/18	3.8/9
Total Disturbed Acres	0	25	14.5
Total % of Project Area Disturbed	0%	0.4%	0.2%

*Estimate acres of landings = ½ acre/landing (S. Bumps, 2004)
**1 mile of road at an average disturbance width of 20' = 2.4 acres of disturbance/mile
***Based on estimated length of skid trails (S. Bumps, 2004) and average disturbance width =20'

Two temporary haul road bridges are proposed for installation on FR 95 for Alternatives 2. These bridges would be located at the western end of the haul road and would cross East Brook and a small unnamed tributary to East Brook. Up to five temporary skid trail bridges may also be needed for Alternative 2. All skid trail and haul road bridges would be installed following Forest Plan Standards and Guidelines and would not constrict bankfull flows. All bridges would be removed and stream banks stabilized following sale closure.

Multiple culverts would be installed along the skid trails and FR 95 for either Action Alternatives. Although placement of the culverts in the stream channel would initially cause some disturbance, properly sized culverts that are capable of passing bankfull flows can minimize future stream crossing impacts. These culverts would be removed following sale closure.

Bridge and culvert stream crossings do result in increased sediment to streams, but not to an extent to affect the designated uses of these Class B streams or to cause water quality standards to be exceeded. Following harvest, all temporary bridges and culverts would be removed, and stream banks would be restored. At this time, any increased sediment inputs would decrease or stop.

The most significant water quality response to fire is increased sediment and turbidity (Landsburg and Tiedemann, 2000). Both surface and rill erosion has the potential to increase following fire. This is due to the reduction of vegetative and litter cover that intercepts rainfall. Reduced cover causes the soil surface to become subject to raindrop impact. The increased erosion is related to the amount of vegetation removed. However, prescribed burns, by design, do not consume extensive areas of organic matter (Baker, 1990). Therefore, cool-burning prescribed fires have been shown to have little impact on erosion and sedimentation, whereas intense wildfires may have substantial impacts (Brooks, et al., 1997). In addition, Compartment 44, Stand 9 is approximately 0.2 miles from the nearest mapped stream. Research has shown that riparian vegetation traps sediment from side slopes that would otherwise enter the channel if riparian vegetation is not present (Brooks, et al., 1997). Since the stand proposed for prescribed fire has a large vegetative buffer strip, it is unlikely that any increased erosion from the prescribed fire would reach flowing water.

In addition to following Forest Plan Standards and Guidelines, the following mitigations are prescribed to prevent sediment inputs to streams. The most effective factor for preventing nonpoint sources of sediment and nutrients from reaching a watercourse is a buffer strip (Gilliam, 1994). As described previously, a 25-foot no-cut and 75-foot partial-cut buffer would protect all perennial channels. Trees would be felled directionally away from streambeds, where possible. Skid trails, including stream crossings, would be laid out prior to harvesting to minimize the number of stream crossings, and harvest activities may be suspended during periods of thaw to protect soil and water resources. Mitigations such as temporary stream structures to protect the channel, drainage structures, and sediment control where needed, protect the overall integrity of the stream. In addition, no new roads or landings are proposed for construction. Most studies show that BMPs are effective at reducing or eliminating transport of sediments into watercourses (summarized by Stafford, et al, 1996).

Most water quality effects related to roads reopening and skid trails are short term in duration through the use of the mitigations described above. However, the effect of elevated turbidity during storm events would probably remain. Skid road contributions would decrease to near zero as the skid trails revegetated and stabilized after use. Turbidity increases during storms related to permanent roads would probably continue to occur as long as the roads are in place. However, this effect would be mostly the same as what is occurring presently since no new road construction is proposed for any Action Alternative.

Maintenance of roads in relation to the proposed action would probably contribute to this effect since disturbance and use of the roadbed allows sediment to mobilize and be removed in subsequent rainfall events. In addition, since the increases in turbidity occur only during storm events when turbidities are naturally elevated, it is not likely these increases would have an effect on aquatic life, stream morphologies, or overall water quality in the watershed. This effect of sediment transported from the forest road system is currently being monitored through the forest wide water quality monitoring plan that takes annual samples across the forest to track numerous water quality parameters, including turbidity.

Based on the previous discussion, the direct and indirect effects on water quality from the proposed Action Alternatives are anticipated to be short-term and localized. FR 95 is well vegetated and stable and shows little evidence of sheet or rill erosion. Landings are also well vegetated and stable. Some remnant skid trails in the Connor Brook watershed were built on terrain that was too steep, and thus have had erosion problems. Following Forest Service Standards and Guidelines for all new skid trails should minimize the possibility of this occurring in the future. Despite some erosion problems in the Connor Brook watershed, water quality remains high. In the project area, the proposed Action Alternatives would not violate the Outstanding Resource Waters standards, or the standards of Class B waters, as mitigations outlined above and in Appendix E would be implemented.

3.7.4.3 Cumulative Effects on Watershed Condition, Water Quantity, and Water Quality

The cumulative effects area (CEA) for water resources is the Connor Brook and East Brook watersheds. The time period for cumulative effects is from 1969 to 2014. This period was chosen to incorporate known past activities and time for the proposed activities to occur and be completed. This scale watershed was selected because it includes all the headwaters of the streams which flow through the proposed units, and at this scale the effects of multiple uses within the watershed could become additive and result in cumulative effects. As water flows downstream, pollutants are mobilized into the watershed, and changes in water yield and chemistry related to the project merge with other waters within the watershed. This scale is large enough to integrate processes within the watersheds and gather the result to a single point at the outlet of each watershed. The outlet of the cumulative effects watershed boundary is the Androscoggin River.

Past and present activities that occur in the CEA watersheds include timber sales, recreation, road maintenance and use, and activities on private land such as developments and roads. Future activities include the proposed action, additional activity in the private lands, continued recreation use, and ongoing road maintenance and use. Atmospheric deposition also occurs throughout the country, including the cumulative effects watersheds.

Watershed Condition

No cumulative effects related to watershed condition are expected in the CEA. As discussed in the direct/indirect effects section of this report, proposed levels of harvesting are not expected to contribute to the instability of Connor Brook or East Brook watersheds. Mitigations such as vegetative buffer strips are expected to minimize the impacts of timber harvesting on stream stability.

Intensive timber harvesting practices in the past have contributed to instability in the Connor Brook watershed. Although water quantities have since returned to normal in this watershed, the combination of large clearcuts and numerous roads and skid trails near stream channels and on steep slopes that were not closed out after use has contributed to instability in the Connor Brook watershed.

A watershed/fisheries restoration project is proposed in the Connor Brook watershed in the next ten years. This project would determine which roads and skid trails in the watershed are currently contributing to the instability of Connor Brook, and would return those roads/trails to a natural state. In addition, large woody debris would be added to Connor Brook and its tributaries to help stabilize the channel bed and banks that were affected by the large clearcuts in 1969, and to increase diversity and fish habitat in the stream.

Water Quantity

No cumulative effects related to water quantity are expected in the CEA. As discussed previously, the Connor Brook Vegetative Management Project is not expected to cause increases in water quantity. Increases in water quantity related to timber harvest returns to normal levels within 7-9 years after harvest (Hornbeck, et al, 1997). The large clearcuts in 1969 would no longer be causing increases in water quantity in the Connor Brook watershed. No timber harvest has occurred in the cumulative effects area in the past ten years, and no additional timber sales are planned in the CEA in the next ten years. Therefore, even at the small subwatershed scale analyzed in the direct/indirect effects section of this report, no increases in water quantity are expected. No wildland or prescribed fires have occurred in the CEA in the last ten years. Prescribed fire is proposed for one stand in this project. There is a possibility that this stand may be burned again in the next ten years. Water quantity increases related to timber harvest are not anticipated to occur. Other than small, localized effects, water quantity increases related to prescribed fire are unlikely.

In addition, to protect against cumulative effects on water quantity from generation of additional runoff by timber harvest, the Forest Plan includes a standard and guideline that limits the amount of clearcutting in a 1,000-acre or larger watershed to 25% within a ten year period (USDA, 2000a). Neither of the Action Alternatives would approach the 25% limit for clearcuts in either the Connor Brook or East Brook watersheds. Alternative 2 proposes the largest amount of

clearcutting. Selection of this alternative would result in only 1% of the East Brook watershed and less than 1% of the Connor Brook watershed being harvested by clearcutting. The extent of clearcutting on private land in the Connor Brook and East Brook watersheds is unknown. However, if all of the private lands within the watersheds were clearcut, the Forest Standards and Guideline still would not be exceeded.

As mentioned around 1969, three large 100-acre clearcuts were harvested in the Connor Brook watershed. These clearcuts likely resulted in increased water yield in Connor Brook and its tributaries for a period of 7-9 years. The increased water yields would have contributed to instability in the channels. In the proposed Connor Brook Vegetative Management Project, clearcuts and other treatment methods are not of the size to noticeably increase water quantity in the streams. In addition, all skid trails proposed for use during the sale would be closed according to Forest Standards and Guidelines following sale completion to minimize the impacts of these trails. Since no changes in water quantity are anticipated in the CEA, it is also unlikely that changes in channel stability as an effect of increased water quantity would occur as a result of the proposed sale.

Water Quality

As discussed in the water quantity discussion, the Connor Brook Vegetative Management Project does not propose to harvest large portions of watersheds. Research shows that watersheds treated with methods similar to those proposed in the alternatives did not exceed water quality standards for nitrate (Stafford, et al., 1996). Large buffer strips should also prevent nutrient increases as a result of prescribed fire (Landsburg and Tiedemann, 2000). Because of this, the removal of vegetation and prescribed fire proposed in this sale is not expected to worsen the impacts of acid deposition on water chemistry.

No known prescribed fires or wildfires have occurred in the cumulative effects area. As discussed previously, stand 44/9 is proposed for treatment through prescribed fire. There is the potential that this stand could be re-burned in the next ten years. Since the stand proposed for prescribed fire has a large vegetative buffer strip, it is unlikely that any increased erosion from the prescribed fire would reach flowing waters. Cumulative effects of prescribed fire on sediment are therefore not anticipated.

Open maintained roads in the CEA are likely contributing to some changes in the routing of water and sediment transport processes where present. This effect increases with proximity to stream and/or degree of slope. Future road activities are not expected to continue as in the past. Roads in the Connor Brook watershed which are contributing to sediment inputs to streams were constructed prior to implementation of the current Forest Plan and BMPs. By following standards and guidelines, water quality problems associated with roads should be minimized. Road density in the watersheds is generally low since the roads are spaced throughout a 6,600-acre cumulative effects area, for an average of 11 feet of road per acre. Road and skid trail impacts would be reduced in the Connor Brook watershed through the watershed/fisheries

project described above. Future road activity on private land is unknown. However, any future road activity has the potential to increase pollution locally, particularly if managed improperly.

Cumulative effects related to past, present, and future recreational activities in the CEA have not been observed or detected. Recreation use in this area is largely limited to roads, trails, and streams. About 13.5 miles of hiking and snowmobile trails are located within the cumulative effects watersheds, with an average density of 11 feet of trail per acre. The trails in the riparian area may be contributing to increased sediment loads into streams at localized areas despite mitigations such as water bars. There is no documentation as to what extent sediment loading is occurring and what the impacts are. Recreational use near a waterbody has the potential to increase the bacterial content of these waterbodies. However, there is no bacterial data in the cumulative effects area, so the extent that current recreational use is impacting bacteria levels in streams is also unknown.

Private lands constitute 3% of the cumulative effects area. At present, water quality and changes to runoff as a result of activities on private land are not causing the streams to exceed water quality standards. However, it is possible that future activities on this ownership could contribute to localized pollution effects if managed improperly.

In summary, there is a low risk of negative cumulative effects on watershed condition, water quantity, or water quality in the cumulative effects area from the Action Alternatives, as these alternatives would create a small amount of new disturbance that would be mitigated as described in this report. The mitigations are expected to be effective based on scientific research and previous experience on the White Mountain National Forest, but no mitigation is 100% effective. By using multiple mitigations, impacts of the proposed project are reduced to negligible or easily recoverable. In addition, watershed condition and water quality should improve in the Connor Brook watershed as a result of the watershed/fisheries restoration project.

3.8 Air Resources

No Issues Related to Air Resources

3.8.1 Affected Environment

The proposed Connor Brook Vegetative Management Project is located within the White Mountains airshed, which is the air over the forest. The project area is located in the predominately north-south trending valleys of Connor Brook and East Brook. Regional winds move from west to east. Local winds are dominated by mountain valley dynamics interacting with large-scale atmospheric movements.

In the White Mountain National Forest, the Class I air quality areas are located in the Presidential Range-Dry River Wilderness and the Great Gulf Wilderness Area. The project area

is designated a Class II air quality area, and is about 9 miles away from Great Gulf Wilderness Area, the nearest Class I air quality area.

There are six major federally regulated air pollutants called National Ambient Air Quality Standards (NAAQS). They are ozone, carbon monoxide, nitrogen dioxide, particulate matter, sulfur dioxide, and lead. The project area is not located in a nonattainment area for any of the NAAQS. The closest nonattainment area is for ozone and is located in Merrimack, Hillsborough, Rockingham, and Strafford Counties in southern New Hampshire (USEPA, 2004). Ozone appears to originate around large urban centers and migrates northward to the White Mountain region during times of high temperature and high levels of solar radiation (NHDES, 2004a). The project area is about 55 miles from the closest part of Strafford County.

Existing emissions in the air or air pollution that occurs in the airshed are mostly related to regional and industrial sources as well as local sources of vehicle emissions and dust from roads. Fire contributes particulates and carbon monoxide to the air. Dust from roads contributes particulates. Automobile emissions are associated with carbon monoxide, hydrocarbons, nitrogen dioxide, and lead. While in the presence of sunlight, some of these pollutants combine to form ozone.

None of these air pollutants currently exceed New Hampshire or federal ambient air quality standards except for short time periods from wood stoves, wildland fires, and prescribed fires. On occasion, ground-level ozone in the area exceeds air quality standards. This occurs mostly in summer months due to weather and air flow, and is not frequent enough for the area to be categorized as a nonattainment area. Wildland and prescribed fire do not occur in the area at a large scale. Most fires in the White Mountain National Forest are less than 5 acres in size. However, on occasion fires have exceeded 100 acres in size.

3.8.2 Direct/Indirect Effects on Air Resources

The direct/indirect effects airshed includes the Connor Brook and East Brook airsheds because the potential effects to air quality generated by any of the proposed activities are likely limited to those areas of operation within the airshed, and they are not expected to extend any further. These airshed boundaries are the same as the watershed boundaries described in the water resources report. The ridges within this airshed form a boundary to local air pollution effects by blocking movement of pollutants, keeping the pollutants within the valleys (Figure 2).

Alternative 1: No Action

No activities are proposed and no additional emissions are expected to take place in the project area, beyond what occurs now. Forest Service classified roads will continue to receive their scheduled level of maintenance. Vehicle use will continue in the project area. These existing emissions are currently contributing to the air quality condition described in the affected environment as well as the larger scale air quality issues discussed in the cumulative effects section of this report.

Action Alternatives 2 and 3

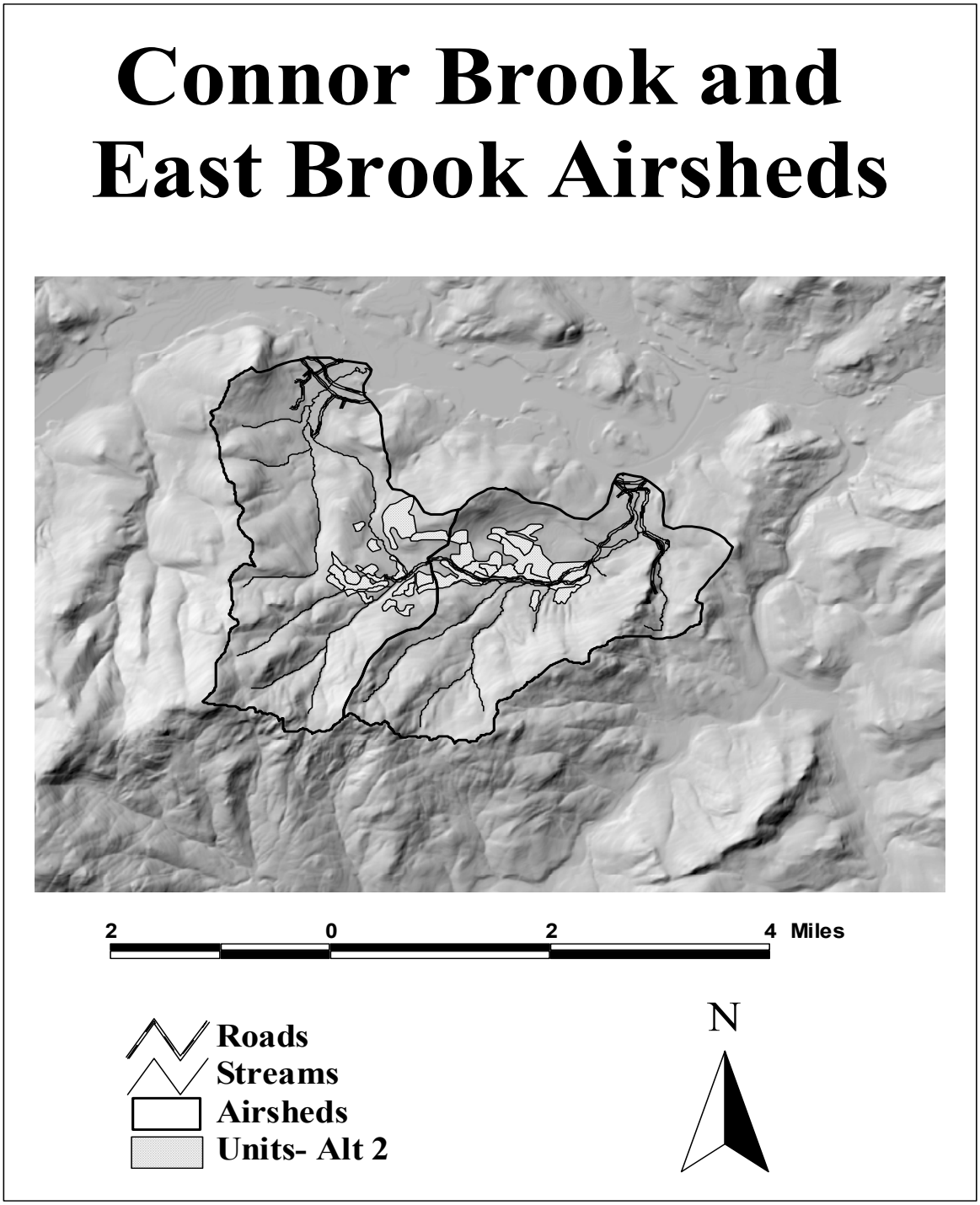


Figure 2: Airshed Analysis Area for Direct/Indirect Effects and Cumulative Effects is the Connor Brook and East Brook Airsheds.

The primary source of concern for air quality from the proposed project is the prescribed burn proposed in Compartment 44, Stand 9. An underburn is proposed in this 29 acre stand to promote oak regeneration. This is considered a permissible open burning activity by the state of New Hampshire (NHDES, 2004b). The major pollutant of concern in smoke from fire is fine particulate matter, both PM10 (particulate matter less than 10 microns in diameter) and PM2.5 (particulate matter less than 2.5 microns in diameter), (USFS, 2002).

Carbon monoxide (CO) concentrations also increase as a result of smoke emissions (USEPA, 2001).The Forest First Order Fire Effects model was run to predict smoke emissions for the proposed underburning. This program considers the region, vegetation type, and the season of burn. The model predicted 1250 lbs/acre of carbon monoxide, 104 lbs/acre of PM2.5, and 122 lbs/acre of PM10 would be emitted by this fire.

The total duration of flaming and smoldering of the fire was predicted to be 26 minutes. Public notification of the proposed prescribed burn would be given prior to the start of the burn. Potential health effects of high exposure of PM2.5 and PM10 emissions include respiratory symptoms and aggravation of heart or lung disease (USFS, 2002). Potential health effects of high exposure of CO include reduced blood-oxygen levels (USEPA, 2001). However, increases in these emissions are short-term and localized. Smoke plumes may degrade air quality in an area for just a few hours before moving and dispersing. As of 2002, prescribed fires were not considered to be a significant cause of nonattainment of NAAQS (USFS, 2002). It is therefore unlikely that a 29 acre prescribed fire would cause nonattainment of NAAQS for these parameters.

An additional concern to air quality is the use of heavy equipment and gas-operated tools during timber harvest and road maintenance operations. Emissions from motor vehicles, heavy equipment, and gas-operated chainsaws could directly affect air quality in the project area. The most significant emissions from diesel motors used to operate heavy equipment and some motor vehicles are nitrogen oxides (NO_x) and particulate matter (PM), both of which contribute to public health problems in the United States. Dust from roads also contributes PM. NO_x emissions from diesel vehicles play a major role in ground-level ozone formation that is most problematic in summer months.

Because of the limited duration of operation and the relative amount of this emission-generating equipment, it is unlikely that the proposed operations would exceed the NAAQS. Ground level ozone is worst during summer months, so fall or winter harvest would minimize this effect so that ozone is unlikely to form at elevated levels as a result of the proposed activities. However, due to recreation concerns in the project area, most units would be harvested in the summer months. For these summer units, effects would depend on levels of emissions from the vehicles and the weather conditions, including amount of sunlight and temperature. These emissions may contribute to ground level ozone in the project area, but they would be short in duration and limited to the areas of operation on any given day.

3.8.3 Cumulative Effects on Air Resources

The cumulative effects area (CEA) for air quality includes the Connor Brook and East Brook airsheds because the potential effects to air quality generated by any of the proposed activities are likely limited to those areas of operation within the airshed, and they are not expected to

extend any further. These airshed boundaries are the same as was described in the direct/indirect effects section of this report.

Timber harvesting has not occurred within the Project Area in the past ten years. The White Mountain National Forest currently has no timber sales planned in the CEA in the next ten years. In addition, no recreation projects, other than routine maintenance, have occurred throughout the CEA. No additional Forest Service recreation projects beyond routine maintenance are expected to occur in the cumulative effects area in the next decade. Limited future activities in the CEA minimize contributions of air pollutants to the region.

Private lands constitute 3% of the cumulative effects area. Numerous roads are located on these private lands, and it is possible that increased development may occur. Wood burning also may occur in this area. It is also likely that timber harvesting is occurring on private land and would continue in the future.

Many of the cumulative effects to air quality occurring in the White Mountain National Forest come from upwind, thousands of miles away in the Midwest. Large coal burning plants and other industrial emission sources contribute oxides of sulfur and nitrogen that have resulted in acid rain. This in turn has led to the acidification of ponds and streams across the forest where the buffering capacity is low. This is discussed further in the water resources report. In addition, effects to soils have occurred. These are discussed in the soil report under soil productivity. Some large sources within the state and region also contribute to these effects.

The New Hampshire Department of Environmental Services has reported that there are no stationary sources of air pollution within the cumulative effects area (NHDES, 2004c).

Alternative 1: No Action

No local emissions related to the proposed action would occur. The existing condition and trends as described in the affected environment would remain much the same. The same activities that currently are occurring on the CEA would continue to occur. Future vehicle emissions are likely to increase as more visitors come to the White Mountain National Forest. This would contribute to ground level ozone when conditions are suitable. Cumulative effects from regional, industrial, and local sources would continue to occur with the same trends.

Action Alternatives 2 and 3

The Action Alternatives would result in the same emission-producing activities as was discussed in the Direct/Indirect Effects section of this report. None of these emissions are expected to contribute to existing cumulative effects already present in the cumulative effects area. This conclusion is reached because, as discussed in the Direct/Indirect section of this report, the emissions related to the Action Alternatives are expected to be within the project area and of limited extent. These limitations are due to the limited duration of these emissions. Effects of activities both on and off Forest Service lands are not expected to cause NAAQS to be exceeded within the time frame analyzed.

3.9 Fisheries

No Issues Related to Fisheries

3.9.1 Affected Environment for Fisheries and In-stream Habitats

The Analysis Area for direct and indirect effects on instream habitats and fisheries resources is the Connor Brook and East Brook watersheds, totaling approximately 6600 acres. Approximately 14 miles of perennial streams are located in the two watersheds.

Brook trout are the Management Indicator Species for lakes, ponds, and stream habitat on the White Mountain National Forest. Important factors for maintaining quality brook trout habitat include cool continuous flowing water, unimpeded travel upstream and downstream, clean gravels for spawning and egg incubation, clear waters during the growing season, instream cover, adequate food supply, high quality headwater streams, and suitable riparian habitat. The desired condition for fisheries resources for all of these streams is to meet Forest Plan Standards and Guidelines for water quality, riparian, fisheries, and aquatic habitat management (USDA, 1986a, LRMP).

Initial field reviews of the project area indicated that the Connor Brook watershed consisted of extensive reaches of unstable stream channels. This degree of channel instability was not noted in East Brook. This analysis will focus more on Connor Brook due to the poorer habitat conditions.

An instream habitat inventory of nearly three miles of Connor Brook was conducted in 1990. Results indicated that the brook was well shaded by riparian forest (50-75%) and that no dams or culverts were present on perennial streams to fragment fish populations within the watershed. Instream wood loadings averaged 27 pieces per mile compared to a Forest-wide average of 186 pieces per mile in streams less than 15' wetted width of the White Mountain National Forest during 1989-1995. Fish cover was also considered to be poor during the survey.

Conditions of Connor Brook may be somewhat different today perhaps due to large flood events that occurred in 1995-96. Channel widening caused some additional wood loading due to bank erosion occurring along the brook surveyed in 1990. Wood loadings are still well below both historic and Forest-wide averages. A lack of rehabilitation of old stream crossings from timber operations in 1969 in addition to large clear cuts within the headwaters may have contributed to channel over-widening. Although past forest management has promoted stream shading to provide coldwater conditions in Conner Brook, instream habitat conditions are poor in the majority of Connor Brook apparently due to the high level of stream bed instability which is described further in the Watershed Condition Section of the EA.

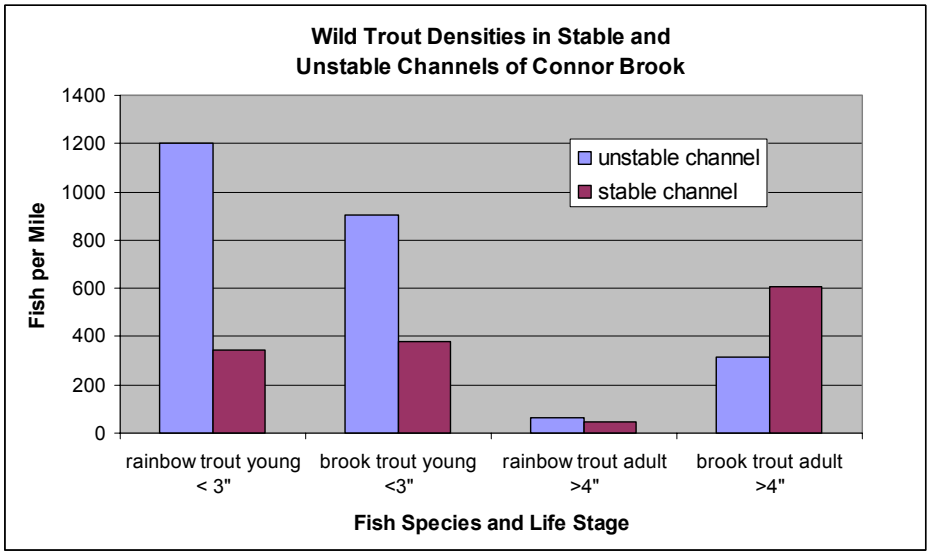
Fish inventories conducted at three sites during the summer of 2004 in the Connor Brook watershed recorded the presence of wild populations of brook trout, rainbow trout, and slimy sculpin in the cold headwaters of Connor Brook. In the lower reaches of Connor Brook,

blacknose dace, longnose dace, lake chub, and longnose sucker are also found in addition to the other three species.

Non-native rainbow trout were introduced into New England waters over 100 years ago and contribute to a highly desirable recreational fishery in the Androscoggin River. Rainbows have become naturalized in many of the tributaries of the Androscoggin within the National Forest. The rainbow trout is a spring-spawning species whereas the native brook trout is a fall spawning species. Fish inventories found very high densities of young wild rainbow trout relative to brook trout (Figure 3). Unstable stream reaches within the watershed may promote increased production of young trout of both species. Stable reaches appear to hold far fewer young of both species; however, adult brook trout dominate in these areas. Adult rainbow trout were uncommon in both stable and unstable reaches.

Connor Brook is dominated by unstable stream beds and this instability is apparently tied to timber harvesting and stream crossing practices used in the watershed in the 1960's, before best management practices and acreage limitations on clear-cutting units were used. Given the dominance of unstable reaches, the brook consists of high numbers of young rainbow trout, high numbers of young brook trout, moderate numbers of small adult brook trout, and very low numbers of adult rainbow trout.

Figure 3. Trout densities in Headwater reaches of Connor Brook.



3.9.2 Direct and Indirect Effects

Direct and indirect effects to fisheries and instream habitat related to timber harvesting practices could potentially result from canopy removal over streams; sedimentation related to temporary road construction, road restoration, stream crossings, skid trails, culvert and bridge replacement, tree felling and landings; fish population fragmentation from stream crossings, and reduced habitat quality due to a decline in either current or future downed wood in the stream channel.

Alternative 1: No Action

There would be no direct or indirect effects on fisheries or instream habitat from taking no action at this time. Abundance of fish populations and condition of their habitats would be a function of current conditions and climatic events. Channel instability would continue to be evident in Conner Brook in the short term while East Brook most likely would remain stable in the absence of a major flood event. Wood recruitment would be a function of tree mortality and natural disturbance events such as wind or ice storms.

Action Alternatives 2 & 3

Harvesting in forest stands adjacent to approximately 1.5 to 2 miles of perennial streams would occur in these alternatives. Appendix D lists the mitigation measures that would be implemented along these riparian areas. The use of a no-cut zone and minimum basal area reserves would minimize any effect on coldwater stream temperatures and the future recruitment of large woody debris. Channel instability would most likely continue in Connor Brook as the project does not address the causes of instability. A separate project is in the initial stages to address this.

Crossings of East Brook and Connor Brook to access timber stands would be done using temporary bridges. These temporary crossings would not require the alteration of bankfull dimensions therefore the potential for localized channel instability is minimal. The construction of stream crossings would not occur during the trout egg incubation period on perennial streams to reduce the risk of sedimentation of important spawning areas.

The effects of the road network and stream crossings needed for timber harvesting in both watersheds is discussed in detail the Water section. Although there is the potential for some short term increases in sedimentation and turbidity, the effects on fish populations would be low and difficult to measure. The use of mitigations and best management practices greatly reduces the potential for effects that would cause watershed-wide declines in fish populations or their habitats.

Abundance of fish populations and condition of their habitats would continue to be a function of current conditions and climatic events. Channel instability would continue to be evident in Conner Brook in the short term while East Brook most likely would remain stable. Wood recruitment would be a function of tree mortality and natural disturbance events such as wind or ice storms.

3.9.3 Cumulative Effects

Cumulative effects to fisheries are similar to those discussed for water quantity and quality. Current fish habitat conditions in Connor Brook are poor due to timber harvesting practices used in the 1960's and flood events that followed. Today, management promotes large trees to grow adjacent to streams. While little change to instream habitat conditions are noticed in the short term, future instream habitat diversity is increased with the recruitment of large woody debris necessary for pool formation, sediment storage, and retention of organic matter (Likens and Bilby 1982). More habitat diversity provides refuge during floods, helping to stabilize brook trout populations (USDA Forest Service 2001a).

Eastern brook trout were monitored at nine sites across the Forest during 1992-1999 as part of the MIS monitoring program. Young-of-the-year brook trout were present at all sites in all

years, indicating that wild trout are well distributed across the Forest and naturally reproducing. None of the sites showed a consistent trend of increasing or decreasing densities over the sampling years. A report concluded the data "did not show any evidence that land use activities are influencing fish populations perhaps due to the larger influence of other environmental factors such as floods or mild winters" (USDA Forest Service 1999). This data also suggests that viable wild brook trout populations are present in four of the major river basins of the White Mountain National Forest (USDA Forest Service 2001a).

Future projects in the Connor Brook project area include an assessment of sources of instability in the Connor Brook watershed. Sources appear to occur in the headwaters where currently no timber harvesting is proposed. Actions proposed in the next 5-10 years would reduce the intensity of spring run-off and precipitation run-off events in the watershed. Addition of wood to intermittent and perennial channels would dissipate stream flow energy allowing sediment storage. Stream stability would be promoted throughout the main stem of Connor Brook. As channel reaches become more stable, adult brook trout would appear to benefit. This would increase the breeding population throughout this watershed which may or may not be isolated from other coldwater watersheds of the Androscoggin River basin. Adult rainbow trout appear to be limited by other factors in the upper portion of the watershed. Rainbows may benefit from stream stability in the lower reach of Connor Brook if water temperatures are warmer than in the headwaters.

3.10 Wildlife

No Issues Related to Wildlife

3.10.1 Wildlife Habitat

3.10.1.1 Affected Environment for Wildlife Habitat

When comparing the Desired Future Conditions for both even and uneven-aged acres by community type in HMU 215, the overall acres of northern hardwoods and hemlock exceeds desired levels and all other habitat types fall well short. With regard to DFC for age class, there is a lack of regeneration age class for all habitat types. There is an abundance of overmature northern hardwoods, spruce/fir, and hemlock and a lack of overmature age class for aspen, paper birch, and oak/pine (Table 15).

In the higher elevations (above 2,500 feet), no vegetative management is permitted. Within HMU 215, these higher elevation lands comprise nearly 1524 acres and contain mature and overmature northern hardwood, mixedwood, and spruce/fir.

The Analysis Area for direct and indirect effects on wildlife habitat is the managed portion (MA 3.1) of HMU 215, since this is the portion of the HMU in which habitat objectives have

been established in the Forest Plan. **The Analysis Area for cumulative effects to wildlife habitat** will include all lands in HMU 215 and the private lands just to the north of the Project Area. An HMU is a building block for the larger wildlife habitat management goals of the 1986 Forest Plan. When vegetative management activities fall within the DFC for a given HMU, the effect cumulatively is that the given HMU contributes to the larger wildlife habitat goals for the National Forest. Non-managed National Forest lands within the HMU boundaries and private lands adjacent to the HMU are considered when analyzing cumulative effects to determine if there are activities taking place elsewhere in the HMU that may affect wildlife habitat. The temporal scope for considering cumulative effects on wildlife habitat is ten years in the past and 10 years in the future. This 20-year time period was chosen because the benefits of regenerating stands diminish after 10 years for some wildlife species.

3.10.1.2 Direct and Indirect Effects on Wildlife Habitat

Alternative 1: No Action

There would be no direct or indirect effects from timber harvest and road restoration activities, such as openings in the forest canopy, residual tree damage, snow or soil compaction, or noise from logging or road equipment. Openings in the forest canopy would result from mortality of individual trees or disturbance from some other natural event (storm, fire, infestation, etc.).

Alternative 2: Modified Proposed Action

Direct Effects

Active timber harvest operations and connected actions, such as road restoration increases short-term human access to the Project Area. When operations are active, negative effects could include displacing wildlife, including nesting birds, or altering travel corridors or mobility of some species, including amphibians, small and large mammals. Beneficial effects of harvesting could include increased mobility for some species on snow compacted by skidder traffic, and additional browse for wildlife from residual treetops scattered on the ground.

Alternative 2 proposes 70 acres of clearcuts or seed tree cuts. In these units, site conditions on the forest floor would be hotter and drier for about 2 to 5 years after cutting with increased decomposition of leaf litter (Fay et al. 1994). This could adversely affect some species of amphibians, such as red-backed salamander (DeMaynadier and Hunter 1998). Individual salamanders in large unshaded openings would not likely survive. Amphibians and small mammals in clearcuts also might be more vulnerable to predation. This would be partially mitigated by leaving reserve patches of trees throughout these units.

Alternative 2 proposes 43 acres of summer harvest (clearcuts, patch cuts, and seed tree cuts in June, July), 425 acres of fall harvest (individual tree selection/group and group cuts in August to October), and 53 acres of winter harvest (various type cuts on winter only soils from December to March). The season in which a unit is harvested may directly affect wildlife, especially during critical times of a species' life cycle. Certain species could be affected by winter harvest (December through March). Some species, including owls, breed in winter. White-tailed deer gather, or "yard", in areas of lowland conifers in the winter, where cover and warmer

temperatures provide protection from the elements, and where they would also be vulnerable to disturbance during this time of year. Specie which utilize cavities in winter such as chickadees and nuthatches; or species which den, such as squirrels and raccoons, could be affected if roost or cavity trees were harvested. Raptors start to breed in February, with young fledging in June and July (Society for the Protection of New Hampshire Forests (SPNHF 1997), so they could be affected by both winter and summer harvest.

No whole tree harvesting would be allowed in any units. Whole trees would be dragged to the landing, limbed, and the tops dragged back in the woods. This practice would provide a one-time input of treetops and branches. Some species such as moose and white-tailed deer could make use of this browse during the winter months.

Direct effects of prescribed fire from the proposed underburn may vary for different species and conditions (Anderson 1994). In general, while some evidence of vertebrate mortality has been reported, the most common opinion is that vertebrates are rarely killed in fires. (Lyon et al. 1978).

Indirect Effects

Effects of creating additional Northern hardwoods and paper birch regeneration age class

This alternative proposes to create 56 acres of northern hardwood regeneration and 14 acres of paper birch regeneration habitat (Table 15). This would benefit species associated with shrub layers, herbaceous ground vegetation, soft mast, and minimal overstory components. Up to 150 species will use northern hardwood regeneration habitat for all or part of their life cycle (DeGraaf et al. 1992, DeGraaf and Yamasaki 2001). Early successional paper birch is used by approximately 150 species of wildlife (DeGraaf et al. 1992).

Northern hardwoods or softwoods rapidly replace the paper birch and aspen component in a forest unless there is frequent disturbance. Clearcutting has been shown to be the best method to regenerate and establish paper birch and aspen (DeGraaf et al. 1992, Perala and Russell. 1983, Safford 1983).

Effects of uneven-aged treatments on Mature Northern Hardwoods, Mixedwoods, Spruce/Fir, and Hemlock

The 422 acres of individual tree and group selection harvests proposed in the Project Area would maintain the mature character of the existing stands. These treatments would remove some mature trees and release the understory to create more vertical structure and layers.

All of these treatments would create disturbance and open the canopy to partial sunlight. There would be minor changes to shading of the forest floor. The result would be to diversify stand structure and increase understory vegetation and browse availability for wildlife. Mast trees such as beech and red oak would be able to develop larger crowns. Over time the existing softwood component within mixedwood stands might be increased. Wildlife species preferring a closed canopy, beech mast, dead trees or softwood cover (DeGraaf et al. 1992) would expect to be favored by these treatments.

Effects of shelterwood harvest on Red Oak

The 29 acres of shelterwood prep harvest in Compartment 44/Stand 9 along with proposed underburns would move an overmature northern hardwood with an oak component towards a red oak stand (Table 15). This would favor species that depend on hard mast as a food source (DeGraaf et al. 1992).

Effect of timber harvest on Dead and Down Wood

In proposed clearcut and seed tree cuts, there would be a lack of larger dead and down wood (>11" DBH) between 10 and 60 years. Residual trees in all other harvest units would continue to supply a component of standing and down woody material as trees die, branches break, and annual litter buildups on the ground. Forest Plan Standards and Guidelines, as well as mitigation measures described in Appendix D, would retain wildlife trees in harvest units for future large cavity trees and dead/down wood. This, in conjunction with the abundance of mature habitat within the managed and unmanaged portions of this HMU, should ensure that an adequate amount of cavity trees and dead and down wood is available for wildlife associated with these habitat features.

Alternative 3: Excluded Roadless Area Action

Direct Effects

Direct effects would be similar to those described for Alternative 2. Alternative 3 has fewer acres of even-aged regeneration harvest than Alternative 3 (Table 16). This reduced even-aged means Alternative 2 would have less impact on amphibians and small mammals vulnerable to increased sunlight and predation in temporary openings than Alternative 3. Overall direct effects would be less as fewer acres are proposed for harvest under this Alternative.

Indirect Effects

Alternative 3 would meet less of the Forest Plan wildlife habitat DFC for HMU 215 than Alternative 2, proposing 54 fewer acres of northern hardwoods regeneration and 6 less acres of paper birch regeneration (Table 15). Indirect effects to uneven-aged management would be similar to Alternative 2 except that fewer acres would be treated. The effects of the shelterwood harvest would be the same.

Table 15. Summary of Wildlife Habitat Objectives for HMU 215 that would be accomplished by Action Alternatives.

	Community	Northern Hardwoods		Paper Birch		Aspen		Spruce/Fir		Hemlock		Oak/Pine		Wildlife Opening
HMU 215														
Regeneration Age Class	**Existing**	0		0		0		0		--		0		9
	Desired	111		33		23		35		--		4		103
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	
	Acres after harvest	56	4		8	0	0	0	0	--	--	0	0	--
Young Age Class	**Existing**	496		0		35		0		--		0		
	Desired	390		147		69		87				20		
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	
	Acres after harvest	496	496	0	0	35	35	0	0	--	--	0	0	
Mature Age Class	**Existing**	810		0		0		0		--		0		
	Desired	502		114		46		192		--		16		
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	--
	Acres after harvest	584	629	0	0	0	0	0	0	--	--	0	0	
Overmature Age Class	**Existing**	793		0		0		51		--		0		
	Desired	111		33		15		35		--		4		
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	--
	Acres after harvest	716	764	0	0	0	0	0	0	--	--	29	29	
Uneven-Aged	**Existing**	787		--		--		202		240		0		
	Desired	821		--		--		274		62		12		
	Alternative	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	**Alt 2**	**Alt 3**	--
	Acres after harvest	1001	956	--				202	202	230	240	0	0	

3.10.1.3 Cumulative Effects on Wildlife Habitat

Alternative 1: No Action

Within HMU 215, there has been no timber harvesting in the past ten years. Following the proposed harvest, no timber harvesting is planned in this HMU in the next ten years. Some timber harvesting has occurred on private land to the north of the Project Area. Over the past 15-20 years this landowner has had several harvesting entries into the area, mostly in the spring. Most of this harvest has been group selection harvest in northern hardwoods. Other activities that have occurred over the past ten years include routine road maintenance on Forest Service roads to keep them clear of encroaching vegetation. A watershed/fisheries restoration project is proposed in the Connor Brook watershed in the next ten years. Some trees would be cut in stands adjacent to Connor Brook and its tributaries to add large woody debris and stabilize the channel bed and banks that were affected by the large clearcuts in 1969, and to increase diversity and fish habitat in the stream.

Mature and overmature northern hardwoods, in even-aged and uneven-aged stands, dominate the Analysis Area and surrounding private land, and they would continue to do so in this Alternative. The trees that would be harvested for the Connor Brook watershed project would not likely affect the mature character of the forested stands adjacent to the brook and its tributaries.

With no timber harvest anticipated on National Forest lands within the Analysis Area over the next 10 years, the cumulative effect of Alternative 1 on MA 3.1 lands would be the loss of age, tree species and structural diversity. Dead or dying trees or small groups of trees may continue to fall to the ground and open limited portions of forest floor to sunlight and regeneration. This alternative would continue to fall short of meeting the need for maintaining diversity for the full range of wildlife species that inhabit the National Forest, and show an overall decline in the regeneration age class. Early-successional habitat types such as aspen would still be present in 10 years, but they would have matured and possibly begun converting towards northern hardwoods or softwood types. This Alternative does not preclude future options for creating early successional habitat or diversifying community types through future stand entries to change stand structure and age class distribution. However, the ability to meet the Habitat Management Goals outlined in the Forest Plan in the reasonably foreseeable future for age class and habitat is somewhat uncertain. Interior forest dwelling species would be expected to increase in numbers while early successional species would decline.

Other past and present actions in this HMU include human use such as hiking, camping, cross-country skiing, snowmobiling, and incidental taking of dead and down wood for firewood. Hunting and trapping also occur in this HMU. The amount of hunting and trapping that occurs within this area is regulated by the New Hampshire Fish and Game Department and follows their management plans. The transportation corridor that has been established over the years to facilitate timber harvesting may have resulted in some increased human access to the area. Human use appears to have been fairly low in this HMU and effects to wildlife are most likely minimal.

Action Alternatives 2 and 3

Past and future activities within HMU 215 are described under the No Action alternative.

Mature and overmature northern hardwoods, in even-aged and uneven-aged stands would continue to dominate the Analysis Area. However proposed regeneration timber harvests and underburning would provide habitat for species favoring disturbance. Alternative 2 would best meet the objectives of the Forest Plan for providing wildlife habitat diversity within HMU 215 (Table 15) however both Alternatives would continue to fall short of the DFC for regeneration age class for all community types in both HMUs.

Roads would be gated to vehicular access upon completion of any proposed timber harvest, so none of the Action Alternatives would likely cause an increase in effects to wildlife from interaction with humans beyond which already exists.

Effects of timber harvesting and connected actions associated with the timber sale on wildlife are in large part mitigated by application of Standards and Guidelines listed in the Forest Plan in Chapter III and in Chapter VII, pages 18–22 of Section B, and the Forest Plan Amendment (USDA Forest Service 2001c and 2001d), as well as specific mitigation measures described in Appendix D.

3.10.2 Management Indicator Species and Other Species of Concern

3.10.2.1 Affected Environment for MIS and Other Species of Concern

Regulations developed in 1982 to implement the National Forest Management Act directed National Forests to identify **Management Indicator Species (MIS)** to monitor the effects of management activities on wildlife habitat. The White Mountain National Forest Plan selected Management Indicator Species that showed "a strong indication of an existing or definable population-habitat relationship"; appeared, as a group, "to cover the range of habitat conditions" found within the National Forest; and "whose population changes are believed to be a result of management activities". The Forest Plan selected MIS for representative community types on lands with and without active vegetation management and for endangered and threatened status. A full discussion of MIS, how they were selected, and how they relate to management activities can be found in Appendix B of the Forest Plan (VII-B, pp 1-28).

Monitoring guidelines for wildlife are found in the Forest Plan (Chapter IV-12). Habitat condition and MIS are monitored Forest-wide, with results compiled and evaluated in annual Forest monitoring reports (USFS 1993, 1994, 1995, 1996, 1998, 1999, 2000a).

Table 16 identifies MIS on the National Forest and whether the indicator habitat occurs or has potential to occur in the Project Area. **The Analysis Area for direct and indirect effects on MIS** is the Project Area, which includes stands proposed for some type of vegetative management, as well as the area associated with connected actions (roads, landings). Representative indicator community types exist or have potential to exist in the Project Area for twelve of the twenty-five MIS: chestnut-sided warbler, Northern goshawk, broad-winged hawk, ruffed grouse, gray squirrel, white-tailed deer, snowshoe hare, Cape May warbler, mourning warbler, brook trout, American marten and Canada lynx. Habitat requirements and limiting factors are described in reference USFS 2001a. Effects to Brook trout are discussed in Section

3.8, Fisheries, and effects to Canada lynx are discussed in Section 3.10, TEP/RFSS and Rare Communities.

The Analysis Area considered for cumulative effects on MIS population trends is the "Focus of Analysis" area described in the report written on the Management Indicator Species and population viability for the White Mountain National Forest (USFS 2001a). The temporal scope for MIS is 10 years past and 10 years future, chosen because the benefits of regeneration age class for some wildlife species diminish after 10 years.

In addition to the MIS described in the Forest Plan, the White Mountain National Forest conducted a **Species Viability Evaluation** (SVE) in 2002 for plant and animal species that might have potential viability concern on the Forest (USFS 2004). Through the SVE process, a list was developed of 57 species that are likely to occur on the Forest whose viability, either within their entire range or only within the National Forest, is a concern now or in the next 20 years; or whose viability might become a concern depending on factors that management of the National Forest could impact. These species are referred to as **"Species of Concern",** and the list is found in Appendix B of this EA.

Thirteen plant species on the list may have suitable habitat in the Project Area; however none of these species were detected during field reviews of or adjacent to the Project Area (unpublished WMNF data). Two wildlife species have suitable habitat in the Project Area: the bay-breasted warbler and American marten. Habitat requirements and limiting factors for American marten and bay-breasted warbler are discussed in reference USFS 2004. The direct and indirect effects for American marten are discussed under MIS.

The Analysis Area considered for direct, indirect and cumulative effects to Other Species of Concern is the same as for MIS.

3.10.2.2 Direct and Indirect Effects on Management Indicator Species

Alternatives 1, 2 and 3

Direct effects to MIS would be the same as those described under Section 3.10.1 (Wildlife Habitat) for all Alternatives.

Table 16 lists the indirect effects on potential habitat for MIS species that may occur in the Project Area for all Action Alternatives. The presence of suitable habitat does not guarantee the presence of a MIS species nor does the lack of suitable habitat foreclose a species from being present. For this analysis, the presence of habitat is used as an indicator for a species presence and effect on population trend.

The creation of northern hardwoods and paper birch regeneration would provide habitat for chestnut-sided warbler, the Management Indicator Species for northern hardwoods regeneration and ruffed grouse, the Management Indicator Species for aspen and paper birch. Other species that would be favored by creating regeneration habitat include American woodcock, olive-sided flycatcher, and Nashville warbler. These species, as well as chestnut-sided warbler and ruffed grouse, are priority bird species associated with regeneration habitat listed in the Partner's in

Flight Bird Conservation Plan for this region (Rosenberg and Hodgman 2000). A variety of woodland bats also would forage in this habitat (DeGraaf et al. 1992).

Maintaining mature and overmature northern hardwoods, mixedwoods, spruce/fir, and hemlock would provide habitat for species such as northern goshawk, Cape May warbler, American Marten, and white-tailed deer, Management Indicator Species that require mature forested habitat for all or part of their life cycle. The patchiness created by group harvesting in mixedwood, spruce/fir, and hemlock habitat may benefit snowshoe hare, in the short term.

Perpetuating an oak stand through timber harvest and underburning would provide habitat for species such as gray squirrel that rely on this community type as a source of hard mast.

3.10.2.3 Direct and Indirect Effects on Other Species of Concern

Direct effects to bay-breasted warbler would be the same as those described under Section 3.10.1 (Wildlife Habitat) for all Alternatives. Indirect effects to bay-breasted warbler would be the same as described for Management Indicator Species associated with mature mixedwoods and softwoods (Table 16) for all Alternatives.

3.10.2.4 Cumulative Effects on Management Indicator Species and Other Species of Concern

Management Indicator Species

The forest-wide habitat and population trends of MIS are described in Table 16.

Alternative 1: No Action

Management Indicator Species associated with mature northern hardwood, mixedwood, spruce/fir, and hemlock habitats (northern goshawk, Cape May warbler, American marten, white-tailed deer) would be favored by this Alternative. Mature and overmature northern hardwood, mixedwood, spruce/fir, and hemlock habitat has been increasing on the WMNF as indicated by WMNF Habitat trend analysis data, 1984-2003 (Tables in Project Files).

Northern goshawk populations appear to be stable within northern New England and the Maritimes (USFS 2001a). Regional data indicate that nesting habitat for this species is expanding in the eastern United States as forests mature. Cape May warbler population trends for northern New England and the Maritimes indicate Cape May warbler populations have fluctuated between 1966 and 1979 but are now stable (USFS 2001a). This species has only been detected sporadically during eight years of bird monitoring on the White Mountain National Forest (MacFaden and Capen 2000). Their populations are known to increase in areas infested by spruce budworm (USFS 2001a). American marten are slowly increasing on the WMNF, particularly in the northern section (USFS 2001a). American marten were reintroduced to the WMNF in the mid-1970s (USFS 2001a). White-tailed deer populations may fluctuate due to winter severity but are stable on the Forest (NHFGD 2004).

Implementation of this Alternative is expected to maintain current habitat and population levels of northern goshawk, Cape May warbler, American marten, and white-tailed deer.

Management Indicator Species associated with aspen and paper birch (broad-winged hawk and ruffed grouse) would not be favored under this Alternative. Regeneration-age classes for both types is declining on the WMNF with mature and overmature paper birch and aspen starting to decline in recent years (WMNF Habitat Trend Analysis 1984 – 2003, Tables in Project Files).

Broad-winged hawk abundance trends in northern New England and the Maritimes appear to be stable (USFS 2001a). Ruffed grouse population trends for northern New England and the Maritimes are increasing slightly (USFS 2001a). Abundance trends on the White Mountain National Forest breeding bird survey plots indicated a decline in ruffed grouse between 1994 and 1998 but a slight increase in 1999 (MacFaden and Capen 2000).

Implementation of this Alternative is not expected to cause a change in broad-winged hawk or ruffed grouse populations over the next ten years as existing young aspen habitat begins to mature and continue to provide habitat.

Management Indicator Species associated with regeneration-age class northern hardwoods (chestnut-sided warbler) would not be favored under this Alternative. This type of habitat has been declining on the forest (WMNF 2003 Habitat trend analysis 1994 – 2003, Tables in Planning Record).

Chestnut-sided warbler trends for northern New England and the Maritimes indicate abundance of chestnut-sided warblers is declining, although abundance trends in northern Maine appear to be increasing (USFS 2000a). Abundance data for chestnut-sided warbler, on a series of transects across the White Mountain National Forest that include both managed and nonmanaged lands, showed a consistent significant decline during eight years of bird monitoring. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000). The downward trend of wildlife species associated with regeneration and early successional habitats is well recognized across New England (Askins et al. 1990, Askins 1993, Smith et al. 1992, Hagan 1993, Litvaitis 1993, Litvaitis et al. 1999, Rosenberg and Hodgman 2000, Thompson et al. 2001). Regrowth of the forest on abandoned farmlands and large scale harvesting in the late 1800s and early 1900s, intensification of agriculture on remaining farmlands, and increased human development are all factors attributed to the decline of this group of species.

Implementation of this Alternative is expected to contribute towards the decline in chestnut-sided warblers across the Forest.

Management Indicator Species associated with regeneration-age class spruce fir (snowshoe hare) would not be favored under this Alternative. This type of habitat has declined on the WMNF below 2500' (WMNF 2003 Habitat trend analysis 1994 – 2003, Tables in Planning Record). However the higher elevation portions of the WMNF provide extensive softwood habitat for snowshoe hare (USFS 2000a).

Snowshoe hare population levels are subject to cyclic fluctuations. Forest-wide populations were considered stable in the early 1990s and appear to be increasing now (USFS 2001a).

Implementation of this Alternative is expected to contribute to the continued low quantity of this habitat type for snowshoe hare in the lower elevations of the Forest. Population trends would not be expected to change due to the abundance of habitat in the higher elevation portions of the Forest.

Management Indicator Species associated with upland openings (mourning warbler) would not be favored under this Alternative. The amount of permanent wildlife openings has increased on the Forest (WMNF Habitat trend analysis 1984 – 2003, Tables in Planning Record). However, many openings are not maintained. The amount of upland fields and shrubby habitats has declined across New England (Thompson et al. 2001).

Regional trends for northern New England and the Maritimes indicate mourning warbler populations are stable (USFS 2001a). Abundance data for mourning warbler, on a series of transects across the White Mountain National Forest that include both managed and nonmanaged lands, showed a consistent significant decline during eight years of bird monitoring. This was at least partly attributed to forest succession within the study area (MacFaden and Capen 2000).

Implementation of this Alternative is expected to contribute to a decline in mourning warblers across the Forest.

None of the MIS species are expected to have their viability jeopardized under this Alternative. For species associated with disturbance, such as chestnut-sided warblers and mourning warblers, populations are not expected to completely disappear from the Forest. Natural disturbances that create openings, such as windfalls or wetlands created by beavers, will continue to provide some of this habitat component across the Forest (USDA Forest Service 2001a).

Action Alternatives 2 and 3

Management Indicator Species associated with regeneration habitat including chestnut-sided warbler would be favored under both Action Alternatives with Alternative 2 creating 56 acres and Alternative 3 creating 4 acres of northern hardwood regeneration habitat. Several bird species, such as chestnut-sided warbler, only occur in regeneration habitat after 2 years and begin to decline in these habitats after 10 years (DeGraaf et al. 1992).

Implementation of this Alternative 2 is likely to contribute towards maintaining populations of chestnut-sided warblers across the Forest. The amount of regeneration habitat created though Alternative 3 would only provide minimal benefits for this species.

Management Indicator Species associated with upland openings including mourning warblers would not be favored under either Action Alternative as there are no opportunities to increase permanent wildlife openings in the Project Area. There may be some temporary benefits associated with the log landings as they revegetate after completion of harvesting.

Expectations are mourning warbler populations would continue to decline within the Analysis Area.

Management Indicator Species associated with paper birch including ruffed grouse and broad-winged hawk would be favored under both Alternatives. Within other stands that have an intermediate or uneven-aged harvest prescription, mitigation measures to maintain a component

of existing mature aspen and paper birch would continue to provide a food source for some species of wildlife and potential nest trees for raptors.

Implementation of either Action Alternative would contribute to maintaining stable populations of broad-winged hawk and ruffed grouse across the Forest, with Alternative 2 providing the greatest benefit.

Management Indicator Species associated with mature northern hardwood, mixedwood, spruce/fir, and hemlock habitats (northern goshawk, Cape May warbler, American marten, white-tailed deer) would still retain suitable habitat under either Action Alternative. In the short term, American marten may find that up to 2 % of the habitat is less suitable if the basal area goes below 80ft². This does not mean marten would totally avoid the area as they utilize a variety of habitats. For stands with an intermediate or uneven-aged treatment, this effect would only last for ten years at the most as basal area would not fall below 60 ft² and stands may grow approximately 2 ft² per year (Leak et al 1987). For stands with a regeneration harvest, once they move into the young age class (10 to 59 years old), many have a basal area above 80 ft².

Implementation of these Alternatives is not expected to result in any changes in northern goshawk, Cape May warbler, American marten, and white-tailed deer populations across the Forest.

Management Indicator Species associated with spruce/fir regeneration age class (snowshoe hare) would have some minimal habitat benefits under both Action Alternatives. The small groups created in softwoods, mixedwood, and hemlock habitats may begin to provide cover after a few years. Snowshoe hare also may find an increased browse source in the clearcut and seed tree cut units.

Implementation of either Action Alternative is not expected to result in any changes to forest-wide population levels of snowshoe hare.

Management Indicator Species associated with mature oak/pine (gray squirrel) would benefit under both Action Alternatives from the proposed conversion of a northern hardwoods stand to oak through timber harvest and associated underburns to increase oak regeneration.

Implementation of either Action Alternative is likely to contribute towards maintaining populations of gray squirrel across the Forest.

None of the MIS species are expected to have their viability jeopardized under either Action Alternative.

3.10.2.5 Other Species of Concern

Other Species of Concern are described in Appendix B.

Alternative 1: No Action

Habitat favored by bay-breasted warbler would be maintained and continue to mature in the Analysis Area. Mature and overmature mixedwood, spruce/fir, and hemlock has been increasing on the Forest (WMNF Habitat trend analysis 1984 – 2003, Tables in Planning Record).

Breeding Bird Survey data (1980-1994) showed a continent-wide 12.2% decrease for this species. However surveys show that the population increases and decreases depending on outbreaks of spruce budworm. WMNF breeding bird surveys showed a mean number of individuals per 15 point transect of 2 in 1997; the mean was less than 1 in 1992-96 and 1998-99 (USFS 2004). This type of fluctuation has been tied to spruce budworm outbreaks.

Implementation of this Alternative is expected to maintain current habitat and population levels of bay-breasted warbler across the Forest.

Action Alternatives 2 and 3

Alternative 2 would release some mature trees and encourage softwood regeneration in 358 acres and Alternative 3 would release some mature trees and encourage softwood regeneration in 201 acres of mature and overmature mixedwoods, spruce/fir, and hemlock habitat maintaining habitat for bay-breasted warbler**.** This might result in minor benefits to habitat favored by bay-breasted warbler.

Implementation of either Action Alternative is expected to maintain current habitat and population levels of bay-breasted warbler across the Forest.

Table 16. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Chestnut-sided warbler *Dendroica pensylvanica*	Regeneration (0-9yrs old) Northern Hardwood & Mixedwood	Yes	Suspect	Declining	Declining	No Change	+56 ac	+4 ac
Northern Goshawk *Accipiter gentilis*	Mature and Overmature (60+ yrs old)) Northern Hardwood & Mixedwood	Yes	Suspect	Un-common but Stable	Mature and Overmature Hardwood Age Class Increasing	No Change	- 89 acres	- 41 acres
Broad-winged Hawk *Buteo platyperus*	Mature and Overmature Paper Birch & Aspen Aspen: 40+ yrs Birch: 50+ yrs	Yes	Suspect	Stable	Mature Age Class decreasing; Overmature Age Class Somewhat Stable	No Change	No Change	No Change
Ruffed Grouse *Bonasa umbellus*	All Ages Classes of Aspen & Regeneration and Young (0-49 yrs) Paper Birch	Yes	Suspect	Declining or uncertain	Paper Birch & Aspen Regen Age Class Decreasing Young Age Classes Increasing	No Change	Aspen Regen No Change Paper Birch Regen + 14 ac	Aspen Regen No Change Paper Birch Regen + 8 ac

Table 16. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Rufous-sided Towhee *Pipilo erythrophthalmus*	Regeneration or Young Oak or Oak/Pine (0-59 yrs)	No	No	Declining	Decreasing	No Change	No Change	No Change
Gray Squirrel *Sciurus carolinensis*	Mature and Overmature Oak or Oak/Pine (60 + yrs)	Yes	Suspect	Stable	Stable	No Change	+29 ac	+ 29 ac
Northern Junco *Junco hyemalis*	Regeneration and Young Pine (0-69 yrs)	No	No	Slight decline	Decreasing	No Change	No Change	No Change
Pine Warbler *Dendroica pinus*	Mature and Overmature Pine (70+ yrs)	No	No	Increasing	Stable	No Change	No Change	No Change
White–tailed Deer *Odocoileus virginianus*	All Ages Hemlock During Deep-snow Winters.	Yes	Documented	Stable	Stable	No Change	Release softwoods in 87 ac of Hemlock.	Release softwoods in 63 ac of Hemlock
Snowshoe Hare *Lepus americanus*	Regeneration or Young Spruce, Spruce/Fir and Fir (0-39 yrs)	Yes	Suspect	Stable to increasing	Decreasing	No Change	Release softwoods in 206 ac of Mixedwood Release softwoods in 65 ac of Spruce/Fir	Release softwoods in 115 ac of Mixedwood Release softwoods in 23 ac of Spruce/Fir

Table 16. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Cape May Warbler *Dendroica tigrina*	Mature and Overmature Spruce, Spruce/Fir and Fir (40+ yrs)	Yes	Suspect	Stable, fluctuate with spruce budworm outbreaks	Increasing	No Change	No Change	No Change
Eastern Kingbird *Tyrannus tyrannus* **Eastern Bluebird** *Sialia sialis*	Upland Openings – Grass, Forbs, Orchard	No	No	Declining Increasing	Stable to Decreasing	No Change	No Change	No Change
Mourning Warbler *Oporornis philadelphia*	Upland Openings-Shrub, Forest Ecotone	Yes	No	Stable	Decreasing	No Change	No Change	No Change
Black Duck *Anas rubripes*	Wetlands and Water	No	No	Declining	Fluctuates with Beaver Activity	No Change	No Change	No Change
Brook Trout *Salvelinus fontinalis*	Permanent Lakes, Ponds, Streams	Yes	Documented	Stable	Stable	No Change	No Change	No Change
American Peregrine Falcon *Falco peregrinus*	Cliffs and Talus	No	No	Increasing	Stable	No Change	No Change	No Change

Table 16. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
American Marten *Martes americana*	At least 80% of their home range must have forest that is 30+' tall with at least 80 ft² of basal area	Yes Approx. 88% of HMU is mature with basal area at least 80 ft².	Documented	Increasing	Increasing	No Change	Habitat Suitability: Potential of (-) 2% from proposed clearcut, seed tree harvest, and shelterwood prep.	Habitat Suitability: Potential of (-) 0.9 % from proposed clearcut, seed tree harvest, and shelterwood prep.
Osprey *Pandion haliaetus*	Large water bodies	No	No	Increasing	Stable	No Change	No Change	No Change
Common Loon *Gavia immer*	Large water bodies	No	No	Increasing	Stable	No Change	No Change	No Change
Sunapee Trout *Salvelinus aureolus*	Deep cold water bodies with shallow gravel bars	No	No	Stable	Considered Extirpated from WMNF	No Change	No Change	No Change
Robbin's Cinquefoil *Potentilla robbinsiana*	Alpine	No	No	Stable	Stable to Increasing; Delisted in 2002	No Change	No Change	No Change

Table 16. Management Indicator Species in Project Area.
See last page of table for explanation of abbreviated headings

Management Indicator Species	Age Class and Representative Habitat	Habitat Present or Potential	Status	Regional Population Trends	Forest-Wide Population Trends	Expected Changes to Existing Habitat Condition from Project Implementation		
						Alternative 1	Alternative 2	Alternative 3
Canada Lynx *Lynx canadensis*	Dense Softwoods	Yes	No	Increasing	Considered Extirpated from WMNF	No Change	Release softwoods in 206 ac of Mixedwood Release softwoods in 65 ac of Spruce/Fir	Release softwoods in 115 ac of Mixedwood Release softwoods in 23 ac of Spruce/Fir
Bicknell's Thrush *Catharus bicknelli* **Blackpoll Warbler** *Dendroica striata*	High Elevation Spruce/Fir	No	No	Declining Stable Fluctuates with spruce budworm outbreaks	Stable	No Change	No Change	No Change

Key to Table 16 Abbreviated Headings;

- **Habitat Present or Potential** – Habitat is present in Project Area or has potential to occur in Project Area
- **Status** – Management Indicator Species is either Documented or Suspected (or neither of the two) within the Project Area
- **RPT** - Regional Population Trend (From: USFS. 2001a. Evaluation of Wildlife Monitoring and Population Viability WMNF Management Indicator Species. White Mountain National Forest, Laconia, NH. 37pp.)
- **FHT** - Forest-wide Habitat Trend – (From: USFS. 1993, 1994, 1996. Monitoring Reports, White Mountain National Forest, Laconia, NH; USFS. 2004. CDS database; USFS. 2001b. Analysis of the Management Situation for Wildlife, White Mountain National Forest, Laconia, NH; Thompson et.al. 2001)

3.10.3 Habitats of Concern

Four types of habitat are considered: exemplary communities, vernal pools/seeps, bear-clawed beech trees, and deer wintering areas (deer yards). **The Analysis Area for direct and indirect effects to these habitats** is the Project Area, including stands proposed for treatment and the connected actions that facilitate treatment (roads, landings, etc.). **The Analysis Area for cumulative effects to these habitats** is the public lands within HMU 215 and the private lands to the north of the Project Area. The temporal scale is 10 years past and 10 years future.

3.10.4 Exemplary Communities

A landscape analysis and/or field reviews have been conducted for exemplary communities within or near the Project Area (unpublished WMNF data 2003, 2004). No exemplary communities were documented in the Project Area (HMU 215).

Alternatives 1, 2 and 3

There would be no direct, indirect or cumulative effects on exemplary communities from any of the Alternatives since none occur within the Project Area.

3.10.5 Vernal Pools/Seeps

3.10.5.1 Affected Environment

Vernal pools are valuable habitat to certain species of amphibians and reptiles; and seeps provide a source of water for wildlife during winter months, as well as providing habitat for rare plants (Tappan 1997, Taylor et al. 1996, Society for Protection of New Hampshire Forests 1997, Carlson and Sweeney 1999). Seeps and vernal pools most likely would form in low lying areas with compacted sediments or underlying ledge where drainage is poor. During field visits by White Mountain staff and a consulting botanist, wet seepy areas and/or vernal pools were identified within Compartment 43/Stands 14, 17, 26, Compartment 44/Stands 4, 6, 7, 11, 13, 17, 25, 26, and Compartment 45/Stands 4 and 9 (field notes in Planning Record, 2003 and 2004 unpublished WMNF data).

Alternative 1: No Action

The No Action Alternative would have no direct or indirect effects on vernal pools or seeps.

Action Alternatives 2 and 3

Direct Effects

There could be direct effects from the Action Alternatives. While riparian areas and any known wet sites are excluded from the harvest area, there is a risk of impacting unidentified wetlands such as vernal pools and seeps. The proposed underburns should have no direct effect on vernal pools as it is unlikely that vernal pools occur in this area. Stand 9 in Compartment 44 is well-

drained and no vernal pools or seeps were observed in field reviews of this stand (field notes in Planning Record).

Indirect Effects

Leaving excessive slash and skidding in and adjacent to vernal pools or seeps could affect the hydrologic function of these areas and impede animal movements. Harvesting adjacent to vernal pools could reduce leaf litter and shade to vernal pools eliminating organic matter input and elevating water temperatures. Mitigation measures described in Appendix D should mitigate these potential effects and minimize the probability of affecting unidentified vernal pools or seeps.

Cumulative Effects on Vernal Pools/Seeps

Past harvesting in HMU 215 followed Forest Plan Standards and Guidelines to protect seeps. No harvesting is anticipated on National Forest lands (following the proposed harvest) over the next 10 years. Timber harvesting (prior to 10 year time frame for the affected environment) has occurred on private land to the north of the Project Area. Best Management Practices for vernal pools are recommended to private landowners (SPNHF 1997). Other past and present actions in this HMU include human use such hiking, camping, cross-country skiing, snowmobiling, and incidental taking of dead and down wood for firewood as well as routine road maintenance on Forest Service roads to keep them clear of encroaching vegetation. The potential for present or future human presence to impact vernal pools or seeps is considered small as few of these areas occur near trails or roads, and future routes would avoid wet areas. A watershed/fisheries restoration project is proposed in the Connor Brook watershed in the next ten years. Some trees would be cut in stands adjacent to Connor Brook and its tributaries to add large woody debris and stabilize the channel bed and banks that were affected by the large clearcuts in 1969, and to increase diversity and fish habitat in the stream. It is unlikely that this activity would have an effect on seeps or vernal pools. Forest Plan Standards and Guidelines (USDA, 1986, LRMP), including Best Management Practices, and mitigation measures listed in Appendix D should protect seeps and vernal pools during proposed harvest activities and proposed future work in the Connor Brook watershed.

3.10.6 Bear-clawed Beech Trees

3.10.6.1 Affected Environment

Black bear use a diversity of habitats to obtain a source of green vegetation in the spring, berries and insects during the summer, and hard mast, such as acorns or beechnuts, during the fall (Rogers and Allen 1987). The Project Area contains a component of red oak and beech, which are the primary hard mast producers in this area. Concentrations of bear-clawed beech are considered an important habitat feature for black bear. Evidence of bear-clawed beech was noted in Compartment 44/Stands 9, 12, 13 and Compartment 45/Stands 4, 9 during field reviews by WMNF staff and consultant botanist of the Project Area. Also noted was some large hemlock trees in Compartment 44/Stand 4 that may be used as bear security trees (field notes in the Planning Record, 2003 unpublished WMNF data 2003).

Alternative 1: No Action

Alternative 1 would have no direct or indirect effects on bear-clawed beech trees.

Action Alternatives 2 and 3

Direct Effects

There could be direct effects to bears feeding in beech trees as both Action Alternatives have some proposed harvest in northern hardwood stands in the fall when bears might be present. Also the proposed underburns in Stand 9 could be implemented during the fall. Most likely bears would be temporarily displaced during active harvest or prescribed fire operations. They would likely move to adjacent hardwood stands in the area.

Indirect Effects

Indirect effects of harvesting or prescribed fire could be a reduction in fall foraging habitat from the removal or loss of some bear-clawed beech trees. A mitigation measure to reserve most bear-clawed beech trees would minimize this effect. Moreover there is an abundance of mature and overmature northern hardwoods habitat with a beech and red oak component within HMU 215 that would not be affected by either Action Alternative. Connected actions of road and landing restoration would not affect bear-scarred beech trees.

Cumulative Effects on Bear-clawed Beech Trees

Within HMU 215, there has been no timber harvesting in the past ten years. No timber harvesting is planned in this HMU in the next ten years. The HMU is dominated by mature and overmature northern hardwoods, which have a component of mature beech and some red oak, both sources of hard mast. The proposed underburns in Stand 29 should increase red oak regeneration to provide a future source of mast trees in this HMU. Some timber harvesting (prior to 10 year time frame for the affected environment) has occurred on private land to the north of the Project Area. Over the past 15-20 years this landowner has had several harvesting entries into the area, mostly in the spring. Most of this harvest has been group selection harvest in northern hardwoods. It is unknown if bear clawed beech trees were affected by these operations. Other past and present actions in this HMU include human use such hiking, camping, cross-country skiing, snowmobiling, and incidental taking of dead and down wood for firewood as well as routine road maintenance on Forest Service roads to keep them clear of encroaching vegetation. These activities would not have an effect on bear clawed beech trees. A watershed/fisheries restoration project is proposed in the Connor Brook watershed in the next ten years. Some trees would be cut in stands adjacent to Connor Brook and its tributaries to add large woody debris and stabilize the channel bed and banks that were affected by the large clearcuts in 1969, and to increase diversity and fish habitat in the stream. Mitigations for harvesting proposed in the Action Alternatives and in the future watershed restoration project would defer high concentrations of bear-clawed beech trees, and protect heavily scarred individual trees in harvest units.

3.10.7 Deer Wintering Habitat

3.10.7.1 Affected Environment

The State of New Hampshire recommends managing deer wintering habitat by interspersing mature softwoods with small openings to perpetuate critical softwood cover, maintain high

quality browse production, and ensure deer mobility throughout an area during the harsh winter months (Society for the Protection of New Hampshire Forests 1997, W. Staats personal communication, 2002).

There is a historical documented deeryard within the Analysis Area. The Connor Brook deeryard was identified within Compartments 44 and 45 (Sikes Act Report 1978, unpublished WMNF Report). Deer wintering activity was observed in Compartment 44/Stands 4, softwood portions of 6, and 7 during the winter of 2004. Very little deer wintering activity was observed in other softwood habitats within the Project Area (unpublished WMNF winter track counts and deer yard surveys).

Alternative 1: No Action

Alternative 1 would have no direct or indirect effects on deer wintering habitat.

Action Alternatives 2 and 3

Direct Effects

Both Action Alternatives would have no direct effects on wintering habitat, since harvest operations would occur in the summer where deer wintering activity was observed.

Indirect Effects

In the short-term, timber harvest would benefit deer by providing an increased source of browse. In the long-term, removal of individual trees and groups would enhance softwood regeneration, possibly providing winter cover for deer in the future. Alternative 2 would encourage softwood regeneration in 358 acres of mature and overmature mixedwoods, spruce/fir, and hemlock habitat and Alternative 3 would encourage softwood regeneration in 201 acres.

Cumulative Effects on Deer Wintering Habitat

Forest Plan Standards and Guidelines, to protect documented deer wintering habitat (Forest Plan -III-18) and to maintain mature and overmature softwood habitat (Forest Plan- III-13), should ensure that deer wintering habitat is maintained across the forest. Connected actions related to this project would not affect deer wintering habitat.

3.10.8 Invasive Plants

3.10.8.1 Affected Environment

Invasive plants can spread to other disturbed habitats by wind, water, wildlife, humans or vehicles transporting seeds or vegetative parts of the plant. Under Executive Order 13112 (February 3, 1999) Federal agencies whose actions may affect the status of invasive species shall not authorize, fund, or carry out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species.

The White Mountain National Forest has been working with The New England Wildflower Society to determine species and locations of non-native invasive plant species. Findings to date

have produced a list of invasive species that exist on or near the National Forest. The majority of locations observed have been on the perimeter of the National Forest, primarily along roads, highways and in developed areas such as towns, residential areas and recreation areas.

Roads: The majority of non-native invasive species (NNIS) locations observed within the vicinity of the WMNF have been along roads and highways, and in developed areas (e.g., towns, housing developments, and recreation areas). Roads, as fragmenting agents, increase the amount of forest-edge habitat on the landscape. The resulting "road-effect zone" is subject to alterations of the microclimate (e.g., increases in light and temperature and a decrease in relative humidity), as well as to frequent and intense disturbance activities (maintenance and traffic), the combined effects of which tend to favor the growth of opportunistic NNIS (Parendes and Jones 2000; Forman and Deblinger 2000). Moreover, roads also serve as major corridors for the dispersal of invasive plants through the spread of seed propagules (e.g., seeds or vegetative fragments) that attach to vehicle hardware (e.g., tires and undercarriages) (Westbrooks 1998; Parendes and Jones 2000; Lonsdale and Lane 1994). Resulting weed infestations can extend from the road's edge to 250 meters into the adjacent forest, or beyond (Saunders et al. 1991; Primack 2000; Forman and Deblinger 2000). A Wisconsin study found that non-natives were most prevalent within 15 meters of the road; however, a few species penetrated up to 150 meters into the adjoining hardwood forest (Watkins et. al. 2003).

Skid trails: Skid trails and haul roads within timber sales serve as the primary conduits for non-native species invasion for the same reasons outlined above. A study on managed forest landscapes in Upper Michigan found that understory plant richness was significantly greater in haul roads than in skid trails and forest, due in large part to a greater percentage of introduced species (Buckley et al. 2002). This increase in non-natives was due predominately to elevated levels of photosynthetically active radiation (a measure of light intensity), soil moisture, and compaction along the road edges. The discrepancy between haul roads and skid trails is likely due to improved conditions (e.g., graded and graveled) and increased traffic along the former. A study in Utah supports this reasoning, finding that roadside habitats adjacent to paved and improved surface roads contain a greater cover of both exotic and native species than similar habitats adjacent to less-impacted four-wheel-drive tracks, a trend that extended well beyond the road cut into adjacent, interior plant communities (Gelbard and Belnap 2003).

Riparian Areas: Several studies have found that riparian areas that have high native species richness also have high non-native species richness, due in part, to the availability of virtually unlimited resources (i.e., high levels of light and nutrients), as well as a relatively constant state of intermediate disturbance (via flooding and bank scouring) that results in continual structural and compositional changes (Stohlgren et al. 2001; Stohlgren et al. 1998, and Planty-Tabacchi et al. 1996). Moreover, streams and rivers form a connected network throughout the landscape, and thus, facilitate the spread of both native and non-native species at a large geographical scale. Disturbance, therefore, in and around riparian areas, would greatly increase the risk of introducing and spreading non-natives to these vulnerable ecological communities.

Two small populations of invasive plants (Sheep sorrel, Coltsfoot) were reported along FR 95 within the project area (WMNF unpublished data 2004). Invasive plants were identified outside the project area along Highway 2 and East Brook during an inventory for invasive plants during 2001 and 2002 (WMNF invasive plant survey, Map in Project Planning Record). The map of invasive plants near the project area, in conjunction with site-specific field surveys, was used to evaluate the likelihood of NNIS spreading to the project area and the environmental consequences of their potential establishment.

The Analysis Area for direct and indirect effects to invasive species is the Project Area, including stands proposed for treatment and the connected actions that facilitate treatment (roads, landings, underburns etc.). The Analysis Area for cumulative effects to invasive species is the lands within HMU 215 and adjacent private land abutting HMU 215 to the north. The temporal scale is 10 years past and 10 years future. For cumulative effects analysis, it is assumed that roads open to vehicular traffic may introduce and/or spread invasive species.

Direct and Indirect Effects on Invasive Plants

Determination of Risk

Forest Service Manual 2080.44.6 outlines the responsibilities of Line officers to determine the risk of NNIS introduction or spread as part of the NEPA process for proposed actions. Risk assessments are to be completed for any ground disturbing activities (FSM 2081.03). For projects having moderate to high risk of introducing or spreading noxious weeds (as determined by project Risk Assessments), the project decision document must identify noxious weed control measures that should be undertaken during project implementation to reduce the potential environmental effects of NNIS (FSM 2081.03-1). The overall risk rating assigned for the Connor Brook Timber Sale is moderate (Project Planning Record).

There is potential for invasive plants to spread into the Project Area along existing roads and other disturbed habitats such as gravel pits and recreation sites. Alternative 1 would not introduce new migration routes or sites for invasive species. Heavy equipment used for timber harvest, road and landing restoration, and any firelines created around Compartment 44/Stand 9 for implementing an underburn in the Action Alternatives could spread invasive species into harvest areas and along roadways. A mitigation to reduce this potential is to clean heavy equipment prior to moving it into the Project Area. Another mitigation is to eradicate the two small populations of invasive plants located along FR 95 prior to any heavy equipment moving into the Project Area.

The potential for invasive species to migrate into the Project Area from surrounding areas (Map in Project Planning Record) is greatest in clearcuts, patch cuts, and seed tree cuts, where the canopy is removed. The risk of migration is greatest for 1-2 years after harvesting, when native plant species are just starting to revegetate the sites. Alternative 2 would create the most clearcuts, patch cuts, and seed tree cuts. To help mitigate the spread of invasive species, at least a 75 foot buffer of vegetation would be maintained between proposed clearcuts, patch cuts and seed tree cuts, and adjacent infested roads and trails. Monitoring for future invasives in the project area will be undertaken during post sale review.

Cumulative Effects on Invasive Plants

Most known locations of invasive species are in developed landscapes surrounding the Analysis Area. These known populations do not appear to be expanding into adjacent forested habitats, due to the inherent stability of closed-canopy ecosystems however, that could change with the introduction of disturbance into these systems. The cumulative effect of timber harvest in this HMU as well as on surrounding private land, particularly even-aged harvest, and associated road reconstruction and maintenance is the increased risk of introducing invasive species into this HMU. The proposed Connor Brook watershed restoration project which is expected to occur within the Analysis Area over the next ten years would have a low likelihood of increasing the chance of invasives being spread into the area as heavy equipment would not be used to implement this project and the disturbance to the forest canopy would be minimal.

Mitigation measures listed in Appendix D should minimize the potential for spread of invasive plants into HMU 215.

3.11 Federal Threatened, Endangered & Proposed Species (TEPS), Regional Forester Sensitive Species (RFSS) and Rare Communities

No Issues Related to TEPS, RFSS and Rare Communities

3.11.1 Affected Environment for TEPS, RFSS and Rare Communities

In 2003 and 2004, two botanical field surveys were conducted in the Project Area (White Mountain National Forest unpublished data).

The Analysis Area for direct and indirect effects to TEPS/RFSS is the Project Area, including stands proposed for treatment and the connected actions that facilitate treatment (roads, landings, underburns etc.). The Analysis Area for cumulative effects to TEPS/RFSS is the WMNF for Indiana bat and the lands within HMU 215 and adjacent private land abutting HMU 215 to the north for eastern small-footed myotis and northern bog lemming. The temporal scale for Indiana bat is 4 years in the past when the USFWS developed Terms and Conditions to minimize take (USFWS 2000) and ten years in the future as the benefits of regeneration age class for some wildlife species diminish after 10 years. The temporal scale for eastern small-footed myotis and northern bog lemming is ten years in the past and ten years in the future because the benefits of regeneration age class diminish for some wildlife species after 10 years.

3.11.2 Biological Evaluation

A Biological Evaluation (BE) for Federally Threatened, Endangered, and Proposed (TEP), and Regional Forester Sensitive Species (RFSS) was completed on November 18, 2004 for all Alternatives proposed for the Connor Brook Vegetative Management Project in HMU 215 (BE, Project Planning Record). The process used and the sources examined to determine potential occurrence of TEP or RFSS presence are listed in the BE.

Based on a pre-field review of all available information, it was the Forest Service Biologist's determination that potential habitat may occur within the Project Area for one Federally Endangered Species (Indiana bat), and two Regional Forester Sensitive Species (eastern small-footed myotis and northern bog lemming). The area could provide adequate habitat for Canada lynx, although this species is considered extirpated from the White Mountain National Forest.

The Biological Evaluation was sent to United States Department of Interior Fish and Wildlife Service (USFWS) for review of effects determination and compliance with Indiana Bat Terms and Conditions, and consistency with Canada Lynx Conservation Measures (November 22, 2004, Letter in Project Planning Record).

There is a risk of unintentional damage if Threatened, Endangered, or Sensitive species of plants exist that were not discovered prior to project implementation (FEIS IV-68, USDA Forest Service 1986b.)

The BE details direct and indirect effects to Indiana bat, eastern small-footed myotis, and northern bog lemming. The expected adverse or beneficial effects to the Indiana bat were determined to be small and "discountable" (defined as those effects that are extremely unlikely to occur). There may be minimal direct and indirect effects to eastern small-footed myotis foraging and roosting habitat. There is a slight potential for the Action Alternatives to temporarily displace northern bog lemmings, although the potential for presence of this species in the Project Area is low.

Canada Lynx Conservation Assessment and Strategy

The Canada Lynx Conservation Assessment and Strategy describes a process to define suitable, unsuitable, and non-lynx habitat and Lynx Assessment Units (LAU) on federal lands. Conservation measures were described for suitable and unsuitable lynx habitat within an LAU (Ruediger et al. 2000). The application of LAU mapping criteria, factors used to define suitable and unsuitable lynx habitat and application of conservation measures on the White Mountain National Forest are discussed in USDA Forest Service 2000e and 2000f. All Alternatives are consistent with the conservation measures outlined in the Canada Lynx Conservation Strategy and Assessment (BE, Project Planning Record).

Terms and Conditions from the Biological Opinion for Indiana Bat

The USFWS outlined Terms and Conditions that must be followed to minimize impacts of incidental take of Indiana bats on the White Mountain National Forest (USFWS 2000), as amended in the Forest Plan (USDA Forest Service 2001c and 2001d). The Terms and Conditions are divided into those that are applicable throughout the year, and those that are applicable during the non-hibernation season (May 15 through August 30). All Alternatives are consistent with the Terms and Conditions outlined in the Biological Opinion (USFWS 2000), as amended in the Forest Plan (USDA Forest Service 2001c and 2001d) (BE, Project Planning Record).

3.11.3 Effects Determination and Rationale

Federally Threatened, Endangered and Proposed Species (TEP)

Canada Lynx

All Alternatives will have *no effect* on Canada lynx since this species is considered extirpated from the White Mountain National Forest. Should lynx reoccupy the Forest, consultation with the USFWS is required under Section 7 of the Endangered Species Act.

Rationale

1) The lynx is considered extirpated based on surveys conducted over the past two decades for this species.

Indiana Bat

All action alternatives *may affect, but would not likely adversely affect* Indiana bat. Since the likelihood of occupancy by Indiana bat is extremely low in the Analysis Area, any effects to Indiana bat from any Action Alternative would be insignificant (cannot meaningfully measure or detect) and therefore discountable (not expected to occur).

Rationale

1) Located at the northern edge of the Indiana bat's summer range, the habitat in the Project Area is mature northern hardwoods, mixedwood, and softwood, with canopy closure often exceeding 80%. Indiana bats prefer roosting and foraging canopy closure ranging from 50% to 70%. The likelihood of Indiana bats occurring in the Project Area is very low.
2) Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for Indiana bat by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000), as incorporated in the Forest Plan Amendment (USFS 2001c and USFS 2001d), should also maintain habitat components needed by Indiana bat and minimize the potential for incidental take of an Indiana bat.

Regional Forester Sensitive Species (RFSS)

Eastern Small-Footed Myotis (Bat)

All action alternatives *may impact individual eastern small-footed myotis, but would not likely cause a trend toward federal listing or loss of viability*. Alternatives 2 and 3 may reduce suitable roosting habitat by cutting some roost trees, but provide some beneficial effects by increasing foraging habitat through openings created by clearcut and seed-tree harvests.

Rationale

1) Most literature indicates that eastern small-footed myotis roost under rocks on hillsides and open ridges, in cracks and crevices in rocky outcrops and on talus slopes, as well as in buildings (Erdle and Hobson 2001). The likelihood that individual bats are roosting in trees in the Project Area is considered low.
2) Forest Plan Standards and Guidelines (USFS 1986a) maintain adequate habitat for eastern small-footed myotis by providing direction to maintain a diversity of habitat conditions well distributed across the Forest (III-13), reserve large wildlife trees in areas managed for vegetation, retain standing dead trees where possible (III-15), and maintain riparian habitats (III-18). Implementing the Terms and Conditions outlined for Indiana bat in the Biological Opinion (USFWS 2000) as incorporated in the Forest Plan amendment (USFS 2001c and 2001d), should also maintain habitat components needed by eastern small-footed myotis.

Northern Bog Lemming

The No Action Alternative would have *no impact* on northern bog lemming. Both Action Alternatives *may impact individual northern bog lemmings, but would not likely cause a trend to federal listing or loss of viability*.

Rationale

1) Northern bog lemmings are rare in New England. The likelihood of an individual occurring in the Project Area is considered low.
2) Identifiable riparian habitat or wet areas are usually excluded from harvest units

minimizing the risk of disturbing an individual animal or associated habitat.
3) Forest Plan Standards and Guidelines maintain a diversity of habitats (III, 12-13) and protect riparian habitats (III-19). It is expected these would minimize negative effects and provide adequate habitat for northern bog lemming.

3.12 Heritage Resources

No Issues Related to Heritage Resources

3.12.1 Affected Environment for Heritage Resources

A cultural resource report (CRRR #04-2-05) was completed for the Project Area based on field surveys and a review of historic maps and literature. The full report is available in the Project Planning Record. No pre-European artifacts or improvements were found within the Project Area.

One Cultural Resource site was found in the Project Area, along with two more sites outside proposed activities but within the Analysis Area. None of these sites are eligible for or are being evaluated for the National Register of Historic Places. Logging camp remains (stove pipe, molten glass, chimney glass fragments, bottles, brick, cookstove) were found beyond the westernmost landing near a small feeder brook of East Brook.

Consultation with local Native American groups has indicated no concerns that any special areas would be disturbed by proposed timber harvest. A careful search of records and local histories has not indicated any unusual activities or camp locations.

The Analysis Area for direct, indirect and cumulative effects to heritage resources is the Project Area. Forest Plan Standards and Guidelines require all earth disturbing activities be designed to avoid, minimize or mitigate adverse effects to heritage resources; and that heritage sites be inventoried, mapped, recorded and protected according to merits beyond the scope of the Analysis Area (potential for the National Register of Historic Places and/or research or interpretive value). Any effects to heritage resources are specific to past, present and potential disturbance to specific sites. An inventoried heritage site within the Analysis Area may have been affected by past actions, but will be avoided in any proposed or future actions.

3.12.2 Direct, Indirect and Cumulative Effects on Heritage Resources

No cultural resource sites were identified in the prescribed burn stand 44/9. No effects are expected from the future watershed project.

Alternative 1: No Action

This alternative would not have any effects on heritage resources.

Action Alternatives 2and 3

All known sites within the Project Area would be avoided during layout, marking and harvesting operations in all Action Alternatives. There are possible indirect effects on undiscovered artifacts caused by summer and fall harvesting operations. These could include destruction of artifacts and degradation of human-made alterations such as former logging campsites. Alternative 2 proposes the most acres of summer/fall harvest (468 acres) and has the potential for the most disturbance associated with logging and road work. Alternative 3 proposes 296 acres of summer/fall harvest. Mitigation measures (Appendix D) are designed to eliminate or lessen any impacts to undiscovered artifacts caused by timber harvesting, road restoration or temporary road construction.

No additional vegetative management activities are anticipated in the Project Area for the next 10 years.

3.13 Socio-Economics

No Issues Related to Socio-Economics

3.13.1. Affected Environment for Socio-Economics

The northern New Hampshire economy relies on the forest products industry and tourist trade. Forest products jobs are among the highest-paying jobs in the area. There are two pulp mills and one paper mill located within 25 miles of the Project Area. There are also several sawmills and forest product-based manufacturers within close proximity. These businesses purchase timber from a variety of sources, including commercial timberlands, private lands, state and town forests, and the White Mountain National Forest.

There is a steady demand for timber products sold by the National Forest, as reflected by bids on timber sales. Typically, average bid prices on National Forest timber equal or exceed those received on private land. This is especially true for sawtimber.

The proposed sale units are all located within the Town of Shelburne, Coos County. The main travel route providing access to the Project Area is U.S. Highway 2 and the Connor Brook Road. These roads have been used for hauling timber in the past, and their continued use for this purpose would not represent a change in expectations for people who regularly travel these roads

There are numerous costs with implementing a vegetative management project on the National Forest. One significant cost is for Analysis: planning the project and analyzing alternatives and potential environmental effects. This includes: 1) surveys (silvicultural, botanical, biological, soil, hydrological and cultural resource); 2) supporting analysis (roads, visual objectives and field data); 3) literature reviews; 4) public involvement; 5) interdisciplinary team planning meetings and; 6) preparation of environmental assessment and decision documents.

Another significant cost is incurred with project implementation, including timber sale preparation (project layout, development of stand prescriptions, boundary marking, marking trees for cutting, contract preparation and appraisal, and advertisement) and timber sale administration (laying out skid trails, contract administration, site inspections, accounting, and supervising road work).

While one purpose for harvesting timber in the Connor Brook Project Area would be to provide high quality sawtimber, the National Forest Management Act provides the direction that a harvesting system should not be selected because it will give the greatest dollar return or the greatest unit output of timber.

Communities within which National Forest timber is harvested are reimbursed for the loss of property tax revenue and timber growth through two separate funds.

- The State of New Hampshire has a tax on the value of timber harvested that is paid by the timber purchaser to the towns in which the timber is harvested. This tax averages about 10% of the value harvested, although it is actually based on the species cut. If the timber is harvested in an unincorporated town, the timber tax is paid to the county. In the case of the Connor Brook project, the Town of Shelburne would receive timber tax directly, while Coos County would receive tax returns for timber harvested in unincorporated towns in the Project Area.

- The Twenty-Five Percent Fund Act of 1908, as amended, directed that 25% of all monies received from a National Forest during any fiscal year should be reimbursed to the state in which the National Forest is located, to be used "for the benefit of public schools and public roads of the county or counties in which such National Forest is situated." For the Connor Brook project, 25% of gross timber receipts would be returned to Coos County.

The Analysis Area for direct, indirect and cumulative effects to socio-economics is the town of Shelburne within Coos County since they would receive funds generated from the proposed harvest (timber harvest tax and 25% fund). Cumulative effects analysis will consider socio-economics activities past (1994-2004), present, and future (2004-2014).

3.13.2 Direct and Indirect Effects on Socio-Economics

Alternative 1: No Action

Since Alternative 1 harvests no timber, local governments in the Town of Shelburne and Coos County would not generate revenue from timber tax receipts, the 25% fund, or through indirect economic activity associated with a logging operation. This alternative would not meet the Forest Plan Forest-wide goal of "assuring a stable, reliable source" of high quality sawtimber as a "raw material to support community stability" (Forest Plan, III-3). The cost of Analysis (project planning and environmental analysis) for this project would be $55,800, the average cost of Analysis for a project on the Androscoggin Ranger District of the White Mountain National Forest (Table 17).

Table 17. Economic Characteristics by Alternative.

Measure	Alt 1	Alt 2	Alt 3
Harvest Volume (mbf)	0	2,020	935
Net Stumpage Receipts*	$0	$363,964	$168,468
Total Costs	$55,800	$112,360	$81,980
• Analysis	$55,800	$ 55,800	$ 55,800
• Sale Preparation	$0	$38,380	$ 17,765
• Sale Administration	$0	$ 18,180	$ 8,415
Net Value	($55,800)	$251,604	$86,488
Unit Cost $/mbf	$0	$55.62	$ 87.68
10% Yield Tax Receipts	$0	$ 36,396	$ 16,847
25% Fund Payments	$0	$90,991	$42,117
*includes estimates of road restoration costs			

Action Alternatives 2 and 3

Each of the Action Alternatives would harvest timber, generating revenue for local governments in the Town of Shelburne and Coos County from timber tax receipts, the 25% fund, and through indirect economic activity associated with a logging operation. The Action Alternatives would meet the Forest Plan Forest-wide goal of "assuring a stable, reliable source" of high quality hardwoods as a "raw material to support community stability" (Forest Plan, III-3). The cost of Analysis for this project would be the same for the Action Alternatives as it was for Alternative 1 ($55,800).

For each of the Alternatives, Table 17 provides a breakdown of estimated gross timber receipts (based on proposed harvest volume and an average bid price of $180/mbf), costs to the Forest Service for preparing and administering the proposed harvest, net receipts, unit cost per thousand board feet harvested, and estimated return to local communities through the NH timber tax and the 25% fund.

Alternative 2 harvests the most timber, and generates the most in stumpage and net receipts. It has the lowest unit costs, and the highest return to local communities through the timber tax and the 25% fund. Alternative 3 harvests less timber, and generates a lesser amount of stumpage and net receipts. It has the highest unit costs, and the lowest return to local communities through the timber tax and the 25% fund.

3.13.3 Cumulative Effects on Socio-Economics

Alternative 1 does not harvest timber, but it does not preclude the harvest of timber in the future. Each of the Action Alternatives would generate revenue for local communities. Alternative 2 generates the most revenue by proposing the most acreage. Alternative 3 proposes a lesser amount of acres of harvest, deferring the harvest of residual sawtimber to some time in the future and reducing revenue generated now. Both of the Action Alternatives would provide a continued source of quality hardwood and softwood sawtimber and other forest products on a sustained basis; and they would support continued employment in harvesting, manufacturing, transportation, and associated forest products industries. Experience has indicated there is and would continue to be demand for timber products locally and nationally. The Forest Service does

not anticipate any additional timber harvest in HMU 215 over the next 10 years; and the largest private forest land manager (Mead WestVaco) has indicated they do not have any timber harvests planned for the next 10 years.

CHAPTER FOUR - PREPARATION & CONSULTATION

4.1 ID Team Members and Forest Service Contacts

The following individuals participated in development and analysis of the proposed action and all other alternatives as well as subsequent preparation of the environmental assessment.

Interdisciplinary Team:

Lesley Rowse	Wildlife Biologist
Wayne Millen	Assistant Ranger - Forester
Stephen Bumps	Forester
Don Muise	Assistant Ranger - Recreation
Steve Fay	Soil Scientist
Tracy Weddle	Hydrologist
Mark Prout	Fisheries Biologist

Forest Service Personnel consulted for professional and technical assistance:

Katherine Stuart	District Ranger
Karl Roenke	Forest Archeologist
Reg Gilbert	Forestry Technician & Timber Sale Administrator
Robert Mengel	GIS Coordinator
Joe Gill	Heritage Resource Paraprofessional
Pat Nasta	Public Affaires and NEPA Specialist
John Jakubos	Engineer Technician

4.2 Other Agencies and Individuals Contacted

Other agencies and organizations consulted for professional and technical assistance:

Brett Engstrom	Botanist, Private Contractor
Will Staats	Wildlife Biologist, New Hampshire Fish & Game Department
Susanna von Oettingen	Endangered Species Specialist, U.S. Fish & Wildlife Service
Sara Cairns	Ecologist, New Hampshire Natural Heritage Bureau

CONNOR BROOK VEGETATION MANAGEMENT PROJECT

Environmental Assessment

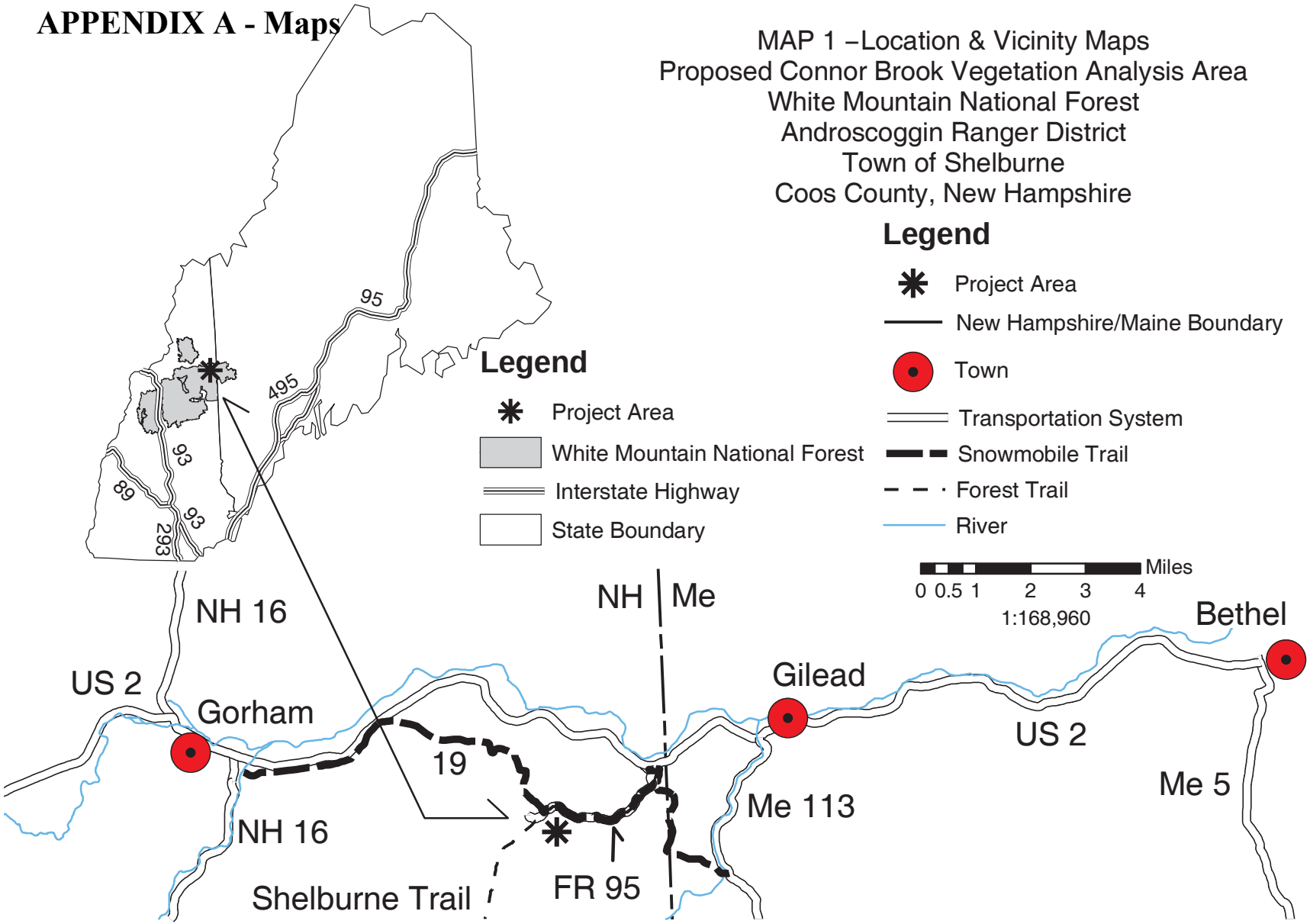
APPENDICES

Appendix A: **Project Maps**
Appendix B: **Species with Potential Viability Concerns**
Appendix C: **Scoping Comments**
Appendix D: **Mitigation Measures**
Appendix E: **Literature Cited**
Appendix F: **Glossary**


WHITE MOUNTAIN NATIONAL FOREST

APPENDIX A - Maps

MAP 1 –Location & Vicinity Maps
Proposed Connor Brook Vegetation Analysis Area
White Mountain National Forest
Androscoggin Ranger District
Town of Shelburne
Coos County, New Hampshire

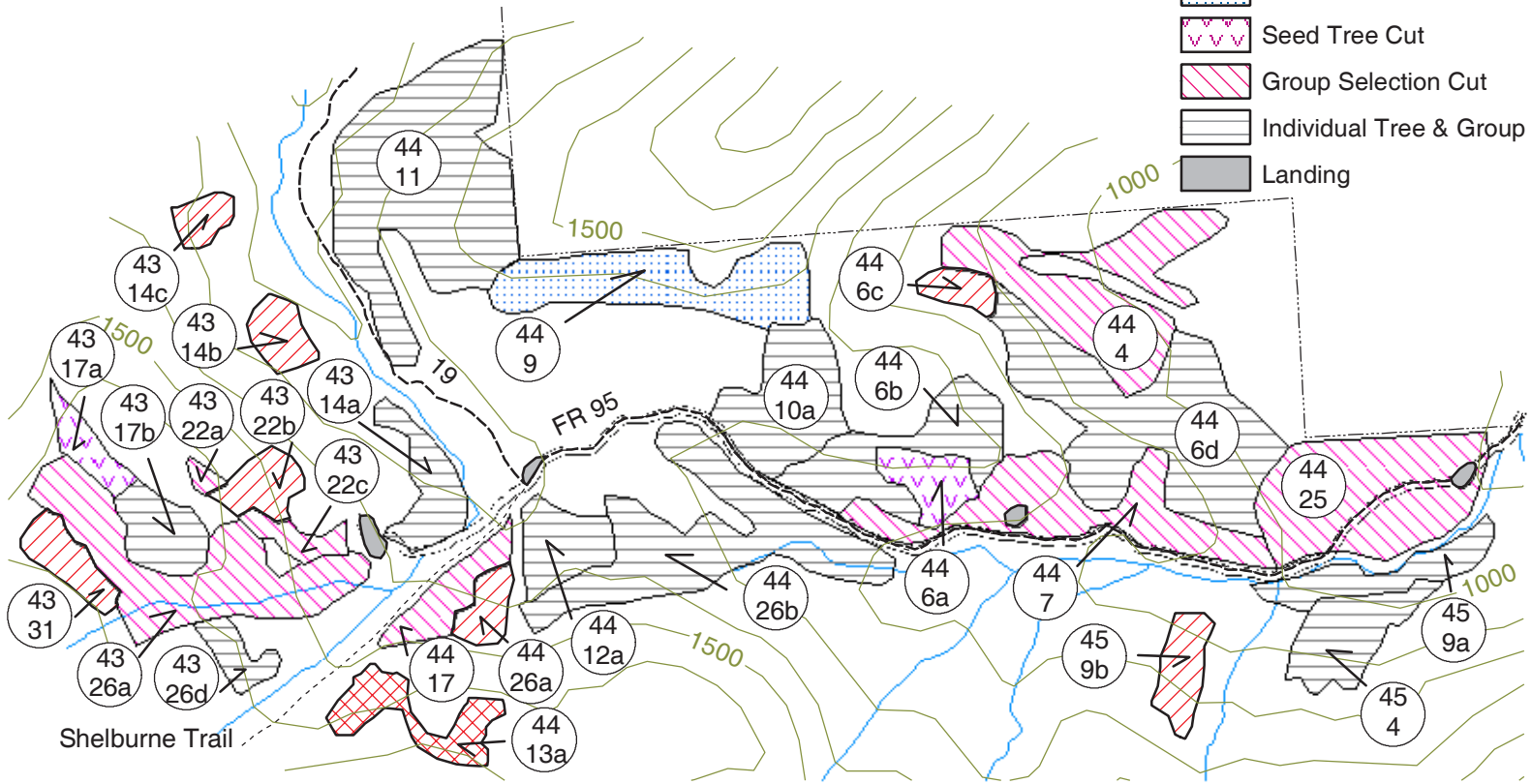


http://www.fs.fed.us./r9/white/current_projects/connor_brook/map_1-loc_&_vic_2004_1015.doc rjm

MAP 2 – Alternative 2
Proposed Connor Brook Vegetation Analysis Area
White Mountain National Forest
Androscoggin Ranger District
Town of Shelburne
Coos County, New Hampshire

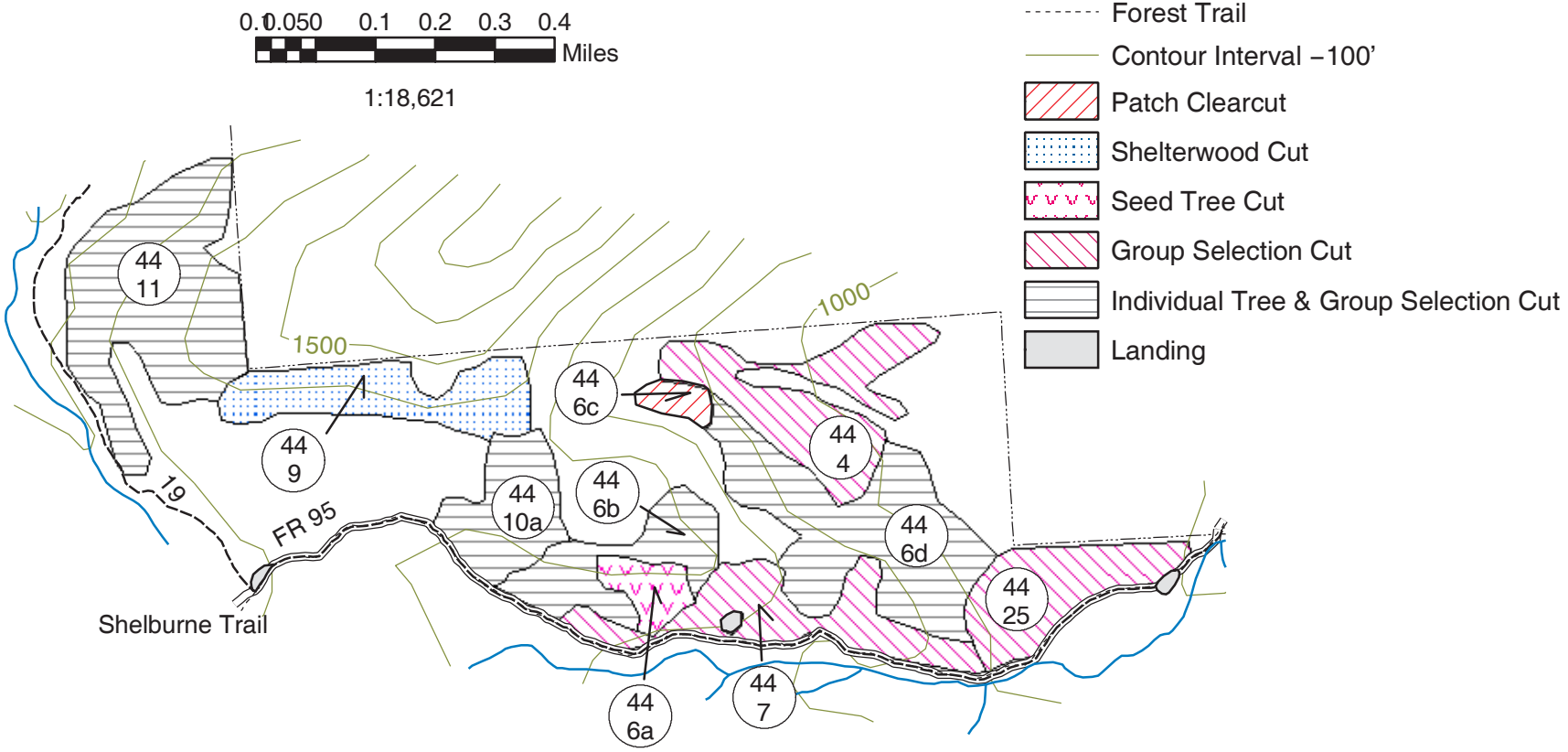
0.1 0.05 0 0.1 0.2 0.3 0.4 Miles

1:19,200



http://www.fs.fed.us/r9/white/current_projects/connor_brook/map_2-alternative_2_2004_1015.doc rjm

MAP 3 – Alternative 3
Proposed Connor Brook Vegetation Analysis Area
White Mountain National Forest
Androscoggin Ranger District
Town of Shelburne
Coos County, New Hampshire



http://www.fs.fed.us/r9/white/current_projects/connor_brook/map_3-alternative_3_2004_1015.doc rjm

APPENDIX B - Species with Potential Viability Concerns

The following table addresses species identified during Forest Plan Revision as of viability concern for the White Mountain National Forest that are not already listed on the Regional Forester's Sensitive Species (RFSS) list for the Forest. For information on RFSS, see the Biological Evaluation.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
AMPHIBIANS						
Jefferson Salamander *Ambystoma jeffersoniannum*	Mixed wetland and forested habitat. Vernal to semi-permanent pools are preferred breeding areas. Surrounding habitat usually mature forest with rocky soils, a duff layer, pit and mound topography, large (> 10 cm) logs, and relatively closed canopy. Usually below 1700' elev. Avoids floodplains.	NO	Vernal Pools may occur in areas with hardpan soils.	NO	**NO**	This species has only been documented on the southern portion of the WMNF.
BIRDS						
Bay-breasted Warbler *Dendroica castanea*	Primarily mature coniferous forests (though mixed forests used) up to 4000'. Prefers the thick lower vegetation at edges of small forest openings.	NO	YES	NO	YES	Mature mixedwood in the project area.
Rusty Blackbird *Euphagus carolinus*	Prefers northern ponds, wetlands, beaver ponds typically between 1000' to 4000' in elev. Nests found in spruce and fir.	NO	NO	N/A	**NO**	No ponds in the project area**.**
Three-toed Woodpecker *Picoides tridactylus*	Year-round resident of spruce/fir zone, which typically occurs above 2500'. Breeds in mature coniferous forest with clumps of snags, including at least some 10-12" in diameter. May prefer flooded or swampy areas.	NO	NO	N/A	**NO**	Project area below 2500'.
Pied-billed Grebe *Podilymbus podiceps*	Waterbodies usually ≥ 12 acres with both open water and emergent vegetation.	NO	NO	N/A	**NO**	No large water bodies in the project area.
FISH						
Atlantic salmon *Salmo salar*	Larger streams of the Merrimack and Connecticut River watersheds. Also Saco River watershed below Hiram Falls.	NO	NO	NO	**NO**	Project area not in these watersheds.
INSECTS						

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Boulder Beach Tiger Beetle *Cicindela ancocisconensis*	Open sand or mix of sand and cobble along permanent streams of mid-sized rivers; feed and live on the sandy areas exposed by receding rivers.	NO	NO	NO	**NO**	Project area is not near a mid-sized river with sandy areas.
Black lordithon rove beetle *Lordithon niger*	Late-successional or old growth northern hardwood or mixed coniferous forest below 2500'. Presently known from The Bowl RNA.	NO	NO	NO	**NO**	No old growth in project area**.**
A big-headed fly *Nephrocerus slossonae*	Late-successional or old growth northern hardwood or mixed coniferous forest above 1500'. Presently known from The Bowl RNA.	NO	NO	NO	**NO**	No old growth in project area.
MAMMALS						
American Marten *Martes americana*	Inhabits coniferous, mixed, and deciduous forest that is 30+' tall with at least 80 ft² of basal area. Prefers structural complexity in stands, including large hollow trees or downed logs.	YES	YES	NO	**YES**	Most of project area has forest 30+ ft. tall with basal area >80 ft^2.
ODONATES						
Southern Pygmy Clubtail *Lanthus vernalis*	Lives in small, shady spring-fed creeks, preferring clean sandy or mud substrates and shallow running water.	NO	NO	NO	**NO**	No streams with sandy or mud substrates in project area.
Forcipate emerald *Somatochlora forcipata*	Found in spring-fed steamlets within subalpine hillside fens with floating vegetation or in pools associated with flowing groundwater in fen areas. Avoid open, sunny fen areas.	NO	NO	N/A	**NO**	Project area is not subalpine.
Ebony boghunter *Williamsonia fletcheri*	Found in low elevation sphagnum bogs adjacent to coniferous or mixed coniferous/deciduous forested areas. Absent from most bogs without sphagnum. Larvae may develop in shallow pools (6" to 12") in sedge fens or among sphagnum mats with open pools and not choked with heaths. It appears to utilize openings within the forest rather than completely open upland habitat.	NO	NO	N/A	**NO**	No sphagnum bogs in project area.
PLANTS						
Missouri rock-cress *Arabis missouriensis*	In the WMNF, probably restricted to semi-open conditions of richer sites. Typically south or west-facing slopes below 1500'. Associated species include red oak, ash, basswood, sugar maple.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Pickering's Reed Bent-grass *Calamagrostis pickeringii*	Uses a variety of habitats including bogs, wet shores, ditches, and dry streambeds. Often, though not always, at high elevations. Acidic peats, sands, gravels, and shores.	NO	SUSPECT	YES	**NO**	Some streams and ditches occur in the project area but surveys did not document this species.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Cut-leaved Toothwort *Cardamine concatenata*	Primarily in rich woods; also in wooded bottoms and on calcareous rocky banks, talus, and ledges. Prefers vernal deciduous openings and closed canopy in summer.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Rocky Mountain Sedge *Carex backii*	Calcareous to circumneutral, dry-mesic, rocky oak-hardwood and limestone hardwood habitat. Also may occur on calcareous to neutral rock outcrops and ledges.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Hair-like Sedge *Carex capillaris*	Snowbank communities and wet rocks in alpine, and wetter areas of dry-mesic heath alpine habitats.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Head-like Sedge *Carex capitata ssp. arctogena*	Wet, acidic, rocky or gravely soil in the alpine. May also occur in similar dry habitats.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Scirpus-like Sedge *Carex scirpoidea*	Strongly associated with circumneutral or calcareous rocky summits, outcrops, and cliffs. In NH, only known from open ledges and subalpine habitats.	NO	NO	N/A	**NO**	No cliffs, rocky summits, or subalpine habitat in project area.
Pale Painted-cup *Castilleja septentrionalis*	Cool, wet ravines, along alpine brooks, and in wet alpine and subalpine meadows. Soil conditions vary by location from moist organic soil to gravelly soil to calcareous cliffs. Good representative of the snowbank/wet meadow/streamside ravine alpine communities.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Fogg's goosefoot *Chenopodium foggii*	At cliff bases, on rocky slopes and outcrops, and in sparsely wooded areas; apparently associated with circumneutral habitats	NO	NO	N/A	**NO**	No cliffs or rocky areas in project area.
Northern Wild Comfrey *Cynoglossum virginianum var. boreale*	Can occur in enriched northern hardwood or mesic red oak northern hardwood, as well as transition limestone hardwood forests. It is mainly in rich mesic woods on sandy or rocky soil where light is available to the understory. Favors southern and western aspects. May also occur on ledges, cliffs, and talus.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Yellow Lady's Slipper *Cypripedium parviflorum var. pubescens*	Rich deciduous woods and swamps, often along the edges of spring run-off streams, usually at low elevations.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Boreal bedstraw *Galium kamtschaticum*	Prefers somewhat rich seep habitats with non-channelized flowing surface water; found in cool, wet hardwood, mixed, or conifer woods, swamps, and streamsides.	NO	SUSPECT	YES	**NO**	Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Moss Bell-heather *Harrimanella hypnoides*	Snowbank communities, wet seeps, and crevices in alpine habitats.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Alpine Azalea *Loiseleuria procumbens*	Exposed dry-mesic heath alpine areas including alpine heath snowbank and the Diapensia-azalea-rosebay dwarf shrubland communities.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Northern Woodrush *Luzula confusa*	In WMNF, appears to be limited to wet ravine alpine and subalpine communities.	NO	NO	N/A	**NO**	No wet ravines or subalpine habitat in project area.
Smooth Sandwort *Minuarta glabra*	Species prefers non-calcareous rocky summits and outcrops up to 3000 ft in elevation. When found in forested habitat in northern New England, it is in openings created by rocky ledges in oak-pine and jack pine communities.	NO	NO	N/A	**NO**	No rocky summits or ledges in project area.
Prairie Goldenrod *Oligoneuron album*	Occurs primarily on dry, calcareous cliffs and ledges. May also occur in open fields and roadsides. All known NH occurrences are on calcareous soil or bedrock.	NO	SUSPECT	YES	**NO**	No cliffs or ledges in project area. Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Mountain Sorrel *Oxyria digyna*	Typically occurs in snowbank communities and on rocky slopes and ledges of headwalls. May occur near alpine streamsides. Above 3500' in northern New England.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Viviparous Knotweed *Persicaria viviparum*	Snowbank communities, wet mossy rocks and seeps, and near streams in alpine and subalpine areas.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.
Alpine Timothy *Phleum alpinum*	In NH, usually uses wet alpine meadows; may also occur in wet ravines and on damp shores in the alpine zone.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Jack Pine *Pinus banksiana*	In WMNF, occurs on rocky summits, rock outcrops and ledges from 2200-4000' elevation; often found on dry, gravelly or sandy sites. Requires moderate to high levels of sun for establishment.	NO	NO	N/A	**NO**	No rocky summits or ledges in project area.
Alpine Meadow Grass *Poa pratensis ssp. alpigena*	In NH, uses nutrient poor soils in alpine/subalpine dry-mesic heath and meadow communities.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Douglas Knotweed *Polygonum douglasii*	Prefers exposed rocky slopes and hillside ledges in well-drained soil where little other vegetation grows. Can also grow in nutrient-enriched hardwood forests if the canopy is open enough; often associated with rocks even in forest.	NO	SUSPECT	YES	NO	No exposed rocky summits or ledges in project area. Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Algae-like Pondweed *Potamogeton confervoides*	Occurs in strongly acidic soft-water bogs, lakes and ponds at a variety of elevations. Also found in slow-flowing acidic streams. Likes muddy shores with lots of vegetation. Not known to occur in beaver ponds.	NO	NO	N/A	**NO**	No slow moving streams, ponds, or bogs in project area.
Yellow Rattle *Rhinanthus minor ssp. groenlandicus*	Snowbank, wet ravine, and wet meadows in alpine/subalpine zone.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.
Lapland Rosebay *Rhododendron lapponicum*	Strongly associated with dry-mesic heath communities in the alpine. Prefers slightly sheltered locations. Does not grow on rock outcrops.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Silverleaf Willow *Salix argyrocarpa*	Moist soils in alpine or subalpine streamside and ravine.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.
Dwarf Willow *Salix herbacea*	In NH, typically occurs in cool, wet ravines, snowbank communities, and along alpine brooks. Grassy, sandy, or rocky places in alpine areas; often on thinner soils than other snowbank/wet ravine species.	NO	NO	N/A	**NO**	No alpine habitat in project area.
Satin Willow *Salix pellita*	Uses river or stream banks, floodplain forest, moist thickets, forested swamps, and lake or pond shores. Prefers nutrient rich alluvium	NO	SUSPECT	YES	**NO**	Streams occur in project area but surveys did not document this species.
Three-leaved Black Snake Root *Sanicula trifoliata*	Limy deciduous woods below 1500'. Most occurrences on steep slopes. Appears associated w/ dense, lush ground cover and relatively closed canopy but has been found near clearcuts and cliffs which may indicate it can take advantage of sunny conditions.	NO	SUSPECT	YES	**NO**	No steep slopes in project area**.** Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Alpine Brook Saxifrage *Saxifraga rivularis*	Alpine ravines, wet and mossy areas, wet cliffs, and some dry-mesic heath alpine/subalpine communities. May benefit from reduced competition associated with moderate disturbance. May be a nitrophile.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.
Arizona cinquefoil *Sibbaldia procumbens*	Snowbank/wet meadow/streamside alpine communities; only occurrence is at bottom of a snowfield.	NO	NO	N/A	**NO**	No alpine habitat in project area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Rock Goldenrod *Solidago calcicola*	Edges of and openings in moist rich woods, rocky or gravelly thickets, talus, and cliffs. Open canopy and nutrient richness are key factors.	NO	SUSPECT	YES	**NO**	No cliffs in project area. Some pockets of enrichment occur in the project area. Plant surveys did not find this species in the project area.
Anderson's sphagnum *Sphagnum andersonianum*	Low hummocks in very poor ericaceous fens.	NO	NO	N/A	**NO**	No ericaceous ferns in project area.
Angerman's sphagnum *Sphagnum angermanicum*	Poor fens, including at edges of ponds	NO	NO	N/A	**NO**	No ericaceous ferns or ponds in project area.
a sphagnum *Sphagnum brevifolium*	Known from poor and intermediate fen habitats. Occupies low hummocks and wet carpets, but seems to prefer high-level carpets.	NO	NO	N/A	**NO**	No fens or bogs in project area.
a sphagnum *Sphagnum flavicomans*	Medium to tall hummocks in bogs and poor fens. An indicator species for the *Sphagnum rubellum/Vaccinium oxycoccus* dwarf heath moss lawn in New Hampshire	NO	NO	N/A	**NO**	No fens or bogs in project area
Lindberg's sphagnum *Sphagnum lindbergii*	In New Hampshire, restricted to alpine and subalpine peatlands, forming carpets in high elevation heath balds and bogs; prefers peatlands with full sun, low to medium nutrient levels, and pH of 4.0-6.0	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.
a sphagnum *Sphagnum majus ssp. norvegicum*	Occurs in lawns in poor sedge fens and along pond margins.	NO	NO	N/A	**NO**	No fens or ponds in project area.

SPECIES WITH POTENTIAL VIABILITY CONCERNS						
Species	**Habitat Requirements**	**Sightings (Present or Historical) within the Project Area?**	**Suitable Habitat within the Project Area?**	**Surveys Conducted within the Project Area?#**	**Project May Impact Species or Habitat?**	**Rationale**
Pylaes' sphagnum *Sphagnum pylaesii*	Forms mats over moist or wet rock or is submerged in fen pools; prefers acidic conditions.	NO	NO	N/A	**NO**	No fens or ponds in the project area.
Alpine Meadow-sweet *Spirea septentrionalis*	Cool wet ravines and snowbank communities in alpine and subalpine habitats. Needs open habitats where forest cannot get established.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.
Ciliated Aster *Symphyotrichum ciliolatum*	Open woods and dry to moist thickets, shores, and clearings; occurs in openings in pine barrens and dry northern hardwood and red spruce-hardwood forest, and likes clearings and roadsides. Prefers scattered small or large openings in the forest canopy, but not necessarily early-successional forest habitat. Uses sandy soils and sometimes rocky sites.	NO	SUSPECT	YES	**NO**	Small openings and roadsides adjacent to hardwoods and mixedwoods occur in the project area but surveys did not document this species.
Northeastern bladderwort *Utricularia resupinata*	Pond, lake and bog shores and margins as well as some wet ditches. Prefers clear, acidic waters with sandy, muddy, or peaty shores. May require low water levels to bloom, and needs a slightly higher than average water temperature.	NO	NO	N/A	**NO**	No ponds or bogs in the project area.
Mountain hairgrass *Vahlodea atropurpurea*	In northern New England, is limited to the alpine/subalpine zone, especially herbaceous snowbanks communities.	NO	NO	N/A	**NO**	No alpine or subalpine habitat in project area.

2003, 2004 plant survey of the project area, (White Mountain National Forest unpublished data).

APPENDIX C – List of Scoping Comments and Responses

Each comment received during the July 2004 scoping period was reviewed to identify specific issues and concerns. Particular alternatives were created based on the comments from some of these issues and concerns, but not all. Each comment is listed with a response of how the comment was addressed and where supporting information can be located in the EA.

We appreciate the time all respondents spent reviewing and commenting on the Connor Brook Project Scoping Letter. Thank you for your thoughtful comments.

Where possible in the following discussions, the respondent is quoted directly and in the context of their full comments. All correspondence is filed and available for public inspection in the Connor Brook Project Planning Record located at the Androscoggin Ranger Station in Gorham, NH.

Comments and responses are grouped by category:

1. Support for Proposed Connor Brook Project
2. Vegetation
3. Recreation
4. Wildlife
5. Roads
6. Roadless
7. General Comments

Support for Connor Brook Project

Comment: "Supportive of the proposal."

Comment: "I do support timber harvest and vegetation stand improvement on the Forest "

Comment: Individual called in support of the project.

Comment: Individual called in support of the project.

Response to the above comments: We appreciate your interest and support of the Connor Brook Project.

Vegetation:

Comment: "Does previous experience in the HMU indicate that the MA 3.1 goal for "high quality saw timber…on a sustained yield basis…" will be met by the proposed action? Has the ratio of high quality saw timber to lower grades improved with each rotation?"

Response: Research conducted by Leak and Sendak in the northern hardwood stands of New England has shown that the percent volume of grade 1 and 2 butt logs has increased

from 21% to 30% for beech and increased from 40% to 65% for sugar maple. This was looking at changes spanning 48 years of individual tree selection harvest.

Comment: " "Commercial timber harvest can be used to achieve these objectives (…increase the amount of light and growing space for spruce/fir and hemlock in the understory…)" It seems doubtful that this applies to all "needs" – particularly spruce-fir."

Response: Individual Tree and Group Selection cuts create small forest openings that are suitable for the establishment of softwood regeneration and are the focus of our efforts towards uneven-aged silviculture on softwood-capable ELTs to maintain or increase the softwood composition.

Comment: "…it would be productive for the Forest Service to re-think some of its basic practices on behalf of the forest habitat. Consistently I see rationales for Forest Service policies based on premises that are obsolete or at least suspect…virtually every timber harvest activity in the WMNF includes Even-aged Managements practices, such as clearcutting, when mounting evidence suggests that flora and fauna thrive best when Uneven-aged Management practices are used… am requesting that the Forest Service broadly re-think its practices for the sake of the forest itself… I am suggesting that the Connor Brook Vegetation Management Project is a good place to begin thinking in terms of a self-sustaining forest. And abandonment of Even-aged Management practices is a good way to start."

Response: We considered an alternative that would use only uneven-aged management techniques, but it was eliminated from analysis because it did not meet the Purpose and Need for lands within MA 2.1 and 3.1 (Section 2.2.1 of the EA). The larger issue of even-aged management of National Forest lands is being addressed by the upcoming Forest Plan.

<u>Recreation:</u>

Comment: "As a mountain biker and back-country skier, I would ask that all possible roads be left in a state where biking and skiing are feasible and allowable. Also, even though I am not a snowmobiler, I ask that all possible roads be left in a state where snowmobiling could be done. This could be either on new roads or roads that were there before. Adding additional snowmobiling trails to connect with already-existing ones would be especially beneficial"

Response: All roads associated with the project will be returned to present conditions, allowing for skiing and snowmobiling use. There are no present or future plans for additional snowmobile trails in the Project Area. Mountain bike use will be dependent upon Forest Plan revision.

Comment: ""Recreation is one of the multiple uses which should be given full consideration. Recreational value is presumably protected if there is no cutting within sight of trails. Please analyze how much timber production would be reduced if a buffer strip were established along the Shelburne hiking trail."

Response: Approximately the first 1.8 miles of the Shelburne trail is also the Connor Brook road where adjacent areas would only be partially cut. After the trail leaves the road stand 44/17 is the only adjacent stand, where group cuts would be located at least 50' from the trail. The Shelburne Trail is considered a low use trail by recreation staff of the

Androscoggin District (Muise, 2004). Forest Plan Standards and Guidelines allow for the use of uneven-aged management adjacent to trail corridors as a measure of protection for trail and recreational values. Slash would be removed within 50 feet of the Connor Brook road/Shelburne trail and lopped to within 3 feet of the ground for another 50 feet.

Wildlife:

Comment: "To approach the MA 3.1 goal to "Increase wildlife habitat for the full range of wildlife species…" it would be necessary to reserve uncut, for the benefit of those species requiring old growth, a certain percentage of MA 3.1 land. I suggest that 20% might be reasonable; this should be well distributed and particularly include low elevation, where natural species diversity is greatest."

Response: The Forest developed a wildlife strategy to provide the major habitat components required by all of the wildlife species that occur on the Forest. This strategy was designed to distribute these habitat components across the landscape (Appendix B. of the Forest Plan, USFS 1986a).

Much of the information that was used to assess species/habitat associations is compiled in *DeGraaf, R. M. and Rudis, D. 1986. New England wildlife: habitat, natural history, and distribution. USDA Forest Service, Northeastern Forest Experiment Station Gen. Tech. Rep. NE-108.* This publication has now been updated (DeGraaf and Yamasaki 2001). Many of the wildlife species on the Forest require mature forested habitats for all or part of their life cycle and many require disturbed habitats for all or part of their life cycle. Disturbed habitats occur as the result of natural disturbances such as wind or ice storms or by manmade disturbances such as timber harvesting.

The wildlife strategy ensures that a large percentage of habitat on the Forest is mature or overmature. Most of the forested habitat on the Forest (approximately 400,000 acres) is not actively managed to change vegetative conditions and is mature or overmature. In addition, approximately 50% of forested habitat within actively managed areas (MA 2.1 and 3.1) (180,000 acres) is designated to be in mature or overmature age class. In general, actively managed lands are below 2500 feet elevation. A ten-year review of the Forest Plan concluded that habitat conditions in the managed portion of the Forest strongly favored species that prefer mature forests (USFS 1997). The Forest has only achieved about 50% of its desired goal for regeneration or young age classes of forested habitat and far exceeded its goal for overmature habitat (USFS 1997).

Management Indicator Species are defined for the various habitats on the Forest. An evaluation of these species showed that most species were stable or increasing in population levels and habitat. The only exception appears to be with species associated with early successional habitats (USFS 2000a, 2001a). Species that would benefit from the creation of early successional habitat are the chestnut -sided warbler, ruffed grouse, rufous-sided towhee, northern junco, eastern kingbird, mourning warbler, eastern bluebird, moose and the snowshoe hare.

Finally, there is old growth habitat at low elevations on the WMNF. Mountain Pond RNA (Research Natural Area) is one example for northern hardwoods. Shingle Pond RNA is another, for both hardwoods and softwoods. The lower reaches of Nancy Brook RNA would qualify. The Bowl RNA is hardwood and softwood old growth (the first RNA designated in the USFS). There is also a hemlock spruce old growth stand along Rattle River, about a mile upstream. We also have approximately 35,000 acres in softwoods and 60,000 acres in hardwoods in low elevation areas that are in an MA where no vegetation management can occur. While these areas are not likely old growth, they are in or moving towards late successional habitat.

We currently have no information that leads us to believe that any of the wildlife species on the White Mountain National Forest are dependent on old growth habitat. One study done on birds in old growth northern hardwood stands in the White Mountain National Forest versus managed northern hardwood stands found no difference in bird species composition (*Absalom S. 1988. Comparison of avian community structure and habitat structure in mature versus old-growth northern forests. M. S. thesis. University of Massachusetts, Amherst. 80pp.*). A recent Species Viability Assessment on the Forest did identify some invertebrate species that are associated with late successional forest (USDA Forest Service 2004).

Comment: "The MA 3.1 goal to emphasize early successional habitat may not be best met by clearcutting, which produces an ephemeral habitat which may not be as valuable as brushland and grassland. Perhaps permanent wildlife openings are better."

Response: Research has found wildlife species associated with disturbance or "early successional habitat" makes use of both clearcuts and permanent wildlife openings (Costello 1995, DeGraaf and Yamasaki 2001, DeGraaf and Yamasaki 2003, King 2000, King et al 2001, Tucker 1986,). In addition, the costs of maintaining PWOs at the few possible locations for this project were considered prohibitive.

Comment: "Please consider the risk and costs associated with actions which might increase the deer population. Chronic wasting disease is a serious problem if the deer population is above the range of natural variation, and damage to oak reproduction is well documented due to grazing."

Response: There are no documented cases of Chronic Wasting Disease in NH to date, and the New Hampshire Fish and Game Department (NHFGD) is monitoring the situation and taking precautions. To learn more about how the State is addressing this concern you can visit their website at http://www.wildlife.state.nh.us/Wildlife/CWD_QandA.htm) and http://www.wildlife.state.nh.us/Newsroom/News_2004/News_2004_Q1/CWD_021004.htm

The WMNF manages habitat for all the wildlife species that occur on the Forest, including white-tailed deer. The Forest works closely with the New Hampshire Fish and Game Department in managing white-tailed deer habitat. Currently, white-tailed deer populations are well below desired levels in Wildlife Management Unit E, which includes the Project Area (NHFGD 2003 Wildlife Harvest Summary). There is no concern about damage to oak regeneration from white-tailed deer. The document that addresses NHFGD population

goals for white-tailed deer can be found at http://www.wildlife.state.nh.us/Hunting/Hunting_PDFs/Wildlife_Harvest_2003.pdf.

Roads:

Comment: "Present policy seems to be to build logging roads to the lowest suitable standard and to pull culverts to minimize maintenance cost and risk of erosion between harvests. If a change in designation from Unclassified to Classified changes this policy, there should be ample opportunity to comment. Since it is a Forest wide policy matter perhaps it should be handled separately".

Response: Changing designation from Unclassified to Classified does not imply a change in road standard. The road would still be managed under the policy the commenter describes. Changes in road designation will not be addressed at this time in the Connor Brook Project but at a later date.

Roadless:

Comment: "As you know, the Friends of Wild River have proposed a Wilderness Area, centered on the Wild River. Furthermore, the Roadless Rule has not been settled yet. What I ask to be done with the Connor Brook logging is to defer it until (1) the forest plan has been revised, and (2) the Roadless Rule has been settled. I would not want any changes to Wild River until those issues have been settled."

Response: Alternative #3 was created in response to this comment requesting a suspension of logging activity in the Roadless portion of the Connor Brook area. As a result, stands within the 2004 Roadless Area Inventory boundary were dropped from consideration for timber harvesting in the alternative. Alternative 2 will not have an effect on the proposed Wilderness Area. In addition, all alternatives of the upcoming revised Forest Plan allow for vegetation management within the Connor Brook Project Area.

Any settlement of the Roadless Rule will not affect the Connor Brook stands as they are not within the 2000 Roadless Area Inventory boundary.

General Comments:

Comment: "In the EA please fully "consider alternatives and analyze effects of the proposed action and alternatives on resources" "

Response: Comment noted.

APPENDIX D – Mitigation Measures

In addition to the applicable Forest-wide and Management Area standards and guidelines listed in the Forest Plan (pages III-5 through III-29 and III-36 through III-41). The following specific mitigation would be applied to all action alternatives.

Vegetation

- To ensure that early-successional species are present in mature hardwood stands for wildlife, a component of mature aspen, paper birch, and softwood would be reserved. For paper birch, 2 or 3 mature or over mature trees would be reserved per acre. For aspen, 2 or 3 mature or over mature trees would be reserved per acre and for softwoods, reserve small inclusions of 2 or 3 trees per acre.
- Beech trees genetically resistent to scale complex would be reserved from harvest.
- The sale administrator will lay out or approve main skid trails through the stands before harvesting begins. This will reduce the area affected by skid trails in the stand, thereby reducing the number of trees damaged.

Visual Quality

- Slash disposal zones would be along FR 95. All slash would be removed within 50 feet of the roadway and lopped to within 3 feet of the ground for another 50 feet.

Soils

- Limit the area used for a landing to minimize soil compaction from heavy machinery. If adequate topsoil is left upon completion of harvesting, scatter any remaining slash on landing. If topsoil is removed and the site is compacted, revegetate with winter rye and allow native vegetation to reestablish over time. If needed use straw as mulch.
- At the completion of the timber harvesting activity, skid trails and temporary access roads to landings will be water barred and seeded with winter rye where there is exposed mineral soil and risk of erosion. With few exceptions, this should prevent soil erosion.

Water

- For all perennial streams, no trees will be harvested from within the active channel/floodplain or a minimum of 25 feet to either side of the top of the bankful mark. Harvesting cannot reduce basal area below 70 square feet for an additional 75 feet from the channel.
- Trees whose roots provide stability to the banks of intermittent streams will be retained when possible.
- Harvest activities may be suspended during periods of thaw.
- Waterbars or other cross-drainage structures would be installed to direct water off skid trails

and roads at intervals required in Forest Plan Standards and Guidelines.

- Where needed, silt fences or another or another effective method will be used to prevent sediment from reaching a stream course disturbed by crossing areas.
- Skidding patterns would be laid out to minimize the number of stream crossings.
- Temporary crossing structures such as box culverts, pipes, or temporary bridges would be installed wherever roads or skid roads crossed flowing water. These crossing structures would be removed and channel banks restored as needed following logging activities.
- Trees will be felled directionally away from streams where possible.
- For stream crossing during the winter, ensure ice is thick and ground is frozen. Where these conditions are not met, use additional mitigations such as more sediment and drainage control and alternate crossing structures.
- The timber sale contract will contain clauses entitled "Prevention of Oil Spills, CT 6.341", "Sanitation and Servicing CT 6.34", and Hazardous Substances CT 6.342, requiring the timber purchaser to take preventive measures to ensure that any spill of petroleum products does not enter any stream.
- Main skid trails will be located on slopes 40 percent or less.
- Watershed protection measures such as waterbars and sediment control will be maintained as considered necessary until no longer needed.
- Stream crossings will be restored, as needed using shaping, matting, seeding, or other effective methods to restore stream morphology and function.
- Install stream-crossing structures at right angles to the stream channel in straight sections.
- Logging debris would not be placed in riparian areas.

Fisheries

- For all perennial streams, no trees will be harvested from within the active channel/floodplain or a minimum of 25' to either side of the top of the bankfull mark. Harvesting will not reduce basal areas below 70 square feet for an additional 75' from the channel.
- Use temporary bridges on all perennial stream crossings and locate at previously used crossing locations.
- Stream crossings should not be constructed on perennial streams during the fish egg incubation period of October through April in areas where potential sedimentation would be detrimental to egg survival.

Wildlife

- During the raptor nesting season, avoid harvesting activities within 0.25 miles of known, active raptor nests. Maintain an uncut buffer of at least 66 feet around known raptor nest trees and retain 65-85% canopy closure within 165 feet of any nest (Flatebo 1999).
- During harvesting, avoid disturbing existing large woody material on the ground, especially hollow logs greater than 18 inches in diameter. Exceptions may include skid trail locations that cannot be moved to avoid such material because of land features.
- Beech trees with an abundance of bear claw marks should not be marked for cutting unless the tree is expected to die in the near future. Exceptions may include hazardous trees or parts of skid trails or landings that cannot be moved because of land features. Another exception would

be in regeneration harvests designed to create optimum conditions for the regeneration of paper birch, aspen or softwoods. In these instances, beech trees may be reserved to meet requirements for reserve patches or wildlife trees. In areas with heavy concentration of bear trees, patches of habitat will be reserved to minimize damage to the trees.

- To have the least impact on wildlife that roost or feed in dead and decayed trees, snags will be left standing unless they pose a threat to personal safety during harvesting activities or they lie within a necessary skid trail location. When implementing Forest Plan Standards and Guidelines for wildlife trees (Forest Plan III-15 and Appendix B-21 as amended in April, 2001), priority will be given to trees that have existing or potential exfoliating bark and observable cavities.
- Vernal Pool Recommendations (from Carlson and Sweeney 1999): Vernal pools are defined as naturally occurring seasonal, semi-permanent or permanent bodies of water, free of predatory fish populations, that provide breeding habitat for certain amphibians and invertebrates. To guide forestry activities, the vernal pool and surrounding area can be divided into three management areas.

  Vernal Pool: The vernal pool depression is the area that is saturated at the time of spring high water. It may be dry during summer or early fall. This depression should remain in an undisturbed state year-round; specifically, the soils should not be compacted or excavated, vegetation should not be disturbed and the area should remain free of slash and sediments associated with harvesting.

  Vernal Pool Protection Zone: The area within 100 feet of the edge of the vernal pool is important to maintain water quality, provide shade and leaf litter, and habitat for migrating amphibians. A forest having at least 70% canopy cover should be maintained and the forest floor should be kept free of ruts, bare soil, and sources of sedimentation. Where possible, harvesting activities should occur during winter when the ground is frozen in order to minimize possible rutting, litter disturbance and sedimentation. However, careful operations under dry conditions can also minimize these effects.

  Upland Amphibian Habitat: Amphibians live in the associated upland habitat for the majority of the year. Where possible, in this zone (between 100 and 500 feet from the edge of the vernal pool) forestry activities should a) minimize disturbance to the forest floor by using controlled yarding, harvesting on frozen ground, and avoiding location of landings and roads in this area; b) maintain natural litter composition by avoiding stand type conversion; c) maintain coarse woody material by leaving limbs onsite (including snags for future down wood) and, d) maintain a shaded and moist forest floor with at least 60% canopy closure.
- Contract provisions will ensure protection of any known T&E plants as well as those identified during the contract term.
- Any prescribed burning of forest stands will follow guidelines outlined in an authorized prescribed burn plan.
- Reserve large hemlock in Compartment 45/Stand 4 that may be used as bear security trees.

Invasive Plants

- Known populations of invasive plants along FR 95 will be removed prior to any proposed activities in the project area.

- Heavy equipment must be visibly free of mud, dirt, seeds, and plant parts prior to entering the project area. Cleaning should take place off-Forest unless a Forest Officer has approved an on-Forest cleaning site in advance.
- To reduce the risk of spreading weed infestations, project operations would begin in uninfested areas before operating in weed-infested areas.
- Before ground disturbance is initiated, control any weeds already existing in the project area.
- Gravel and fill must come from weed-free sources. The Forest will be available to work with owners of local gravel sources to identify weed-free borrow material in their pits. The entire pit or fill area need not be identified as weed-free; material may be used that is not likely to contain invasive plants or seeds.
- Retain native vegetation in and around the project activity to the maximum extent possible. For clearcuts adjacent to infested roads, maintain a vegetation buffer of at least 75 feet between the road and cutting boundary. For activities adjacent to streams and rivers follow current standards and guidelines regarding management within riparian areas.
- Minimize soil disturbance to no more than needed to meet project objectives. Logging practices that reduce soil disturbance include, but are not limited to, oversnow logging and reuse of landings, skid trails, and haul roads.
- Where project disturbance creates bare ground, consistent with project objectives, re-establish vegetation to prevent conditions to establish weeds. Use native seed where appropriate and feasible, and use certified weed-free or weed-seed free hay or straw where certified materials are reasonably available. Where impractical, use a non-persistent, fast growing species like winter rye.

Prescribed Burning

- Prescribed burns shall be undertaken in the spring before May 15th and in the fall after August 30th to accommodate the non-hibernation season for Indiana Bats.
- Known cultural sites will be clearly marked on burn plans and maps, and protected by a fuel break where necessary prior to any prescribed burns.
- Workers clearing fire lines or mechanically treating a site will be directed to cease operations in a particular spot if they should uncover previously unknown cultural sites or artifacts, and contact the District Paraprofessional Heritage Resource Specialist and Forest Archaeologist to evaluate the artifacts or sites and determine protection measures.
- Notify adjacent landowners and local officials prior to a prescribed burn.

Heritage Resources

- Timber markers will create a buffer around any discovered Heritage Resource sites by not marking trees within one-and-one-half tree lengths from artifacts.
- The Sale Administrator will ensure that skid trails and felling/skidding operations do not interfere with any of these sites.
- If unknown sites or artifacts are located within the Project Area, harvesting would be halted until the Forest archaeologist or district paraprofessional can evaluate the findings and make recommendations on how to proceed.
- Cultural resources would be identified on sale area maps and in the timber sale contract.

- Provisions within the timber sale contract would address protection to heritage resource sites should any be discovered within the Project Area.

Recreation

- Speed limit and hazard safety signs will be posted on FR 95 during harvest activity.
- Group cuts in stand 44/17 will be located at least 50' from the Shelburne Trail.

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APPENDIX F – Glossary

Basal Area (BA) - The area of the cross section of a tree a 4.5 feet above the ground. Generally expressed as total Basal Area per acre. Under uneven-aged management, usually 30 to 40 percent of the basal area is removed. Under even-aged management, 30 to 100 percent of the basal area is removed depending upon the needed silvicultural treatment.

Ecological Land Type (ELT) - An area of land with a distinct combination of natural, physical, chemical, and biological properties that cause it to respond in a predictable and relatively uniform manner to the application of given management practices. In a relatively undisturbed state and/or at a given stage (sere) of plant succession, an ELT is usually occupied by a predictable and relatively uniform plant community. Typical size generally is several hundred acres.

Ecological Land Type Phase - These are subdivisions of those ELTs where vegetation management is most common. They share the same characteristics as ELTs; however, their size is smaller (10-100 acres) and the biological and physical conditions are more limited. They are locally known as Forest Habitat Types.

Even-aged Management - A timber management system that results in the creation of stands where trees of essentially the same age grow together. Harvest methods producing even-aged stands are clearcut, thinning shelterwood, and seed tree.

> **Clearcutting** - removal in a single harvest of the entire stand to prepare the area for rapid seed germination and growth of a new even-aged stand of shade intolerant trees. Shade intolerant trees are tree species that need full or near full sunlight to regenerate and grow.
>
> **Salvage Cut** - Trees are harvested after some natural disturbance in order to salvage potential wood products before the trees become less valuable or unmerchantable. Depending on the severity of damage, the harvest may consist of harvest of individual trees or of groups of trees. In severe cases, all trees in a stand may be removed to begin a new stand. Disturbances include but are not limited to wind, ice storms, fire, insect infestations and disease.
>
> **Seed Tree** – A harvest that leaves five or so dominant trees per acre as a seed source for the regenerating stand. A seed tree harvest appears similar to current clearcut units in that both prescriptions leave individual trees standing per acre within a unit to meet silvicultural or other resource objectives.
>
> **Shelterwood** - This harvest method provides a source of seed and shade protection for regeneration. The original stand is removed down to a prescribed basal area, in

two or more successive harvests. The first harvest is ordinarily the seed cutting (sometimes called the regeneration cut). A second harvest often follows a number of years later once regeneration is well established, and is referred to as a final harvest or shelterwood removal harvest. An even-aged stand results.

Thinning - Thinning operations where the harvested material can be sold on the market as opposed to pre-commercial thinning.

Exemplary community – Any occurrence of a rare community, a reasonably intact or undisturbed example of an uncommon community, and a large and/or particularly undisturbed or older example of a common community (Sperduto 1997).

Forest Product - Sawtimber, millwood, pulpwood, and chipwood are the raw products utilized from a tree in a minimum piece length of 8 feet.

Sawtimber minimum piece specification requires a minimum diameter outside bark of 9.0 inches for softwood and 11.0 inches for hardwood and 40 percent sound wood.

Millwood minimum piece specification requires a minimum diameter outside bark of 8.0 inches for paper birch and 50 percent sound wood.

Pulpwood minimum piece specification requires a minimum diameter outside bark of 5.0 inches and 50 percent sound and reasonably straight.

Chipwood refers to utilization of that material beyond the merchantable top, including branches and the top. Chipwood does not meet minimum piece specifications for pulpwood.

Habitat Management Unit (HMU) - A large unit of land with boundaries commensurate with compartment boundaries, and which includes a mix of habitat types. At least one of these types must be a pond or stream with wetland potential.

Habitat Type - A small unit of land from a few to over 100 acres lying within a given climatic mineralogical zone and supporting a distinct successional sequence of vegetation growing on a unique type of soil material.

Indicator Species - A plant or animal species adapted to a particular kind of environment. The arrangement of habitats (by tree species and age group) reflects requirements for selected wildlife species. They are designated a management indicator species. Their presence is sufficient indication that specific habitat conditions are also present. These species represent groups of other species with similar habitat requirements.

Interdisciplinary (ID) Team - A group of individuals with skills for management of different resources. An interdisciplinary team is assembled because no single scientific discipline is

sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process.

Non-Attainment Area – Area that does not meet one or more of the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act.

Projected Existing Condition of Habitat Management Unit - The existing acres of the community type by age class would change over time. The expected changes are projected to a future year that becomes the existing condition for that community type by age class.

"Q" Factor - A method used in uneven-aged management to express the desired number of trees by diameter class. A "Q" factor of 1.5 means that each diameter class would have 1.5 times the number of trees than the next highest diameter class.

Riparian Management Zone - A term used by the Forest Service which includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands.

Road reconstruction - rebuilding a road to the standard originally constructed. For example, replacing temporary drainage structures, temporary removal of waterbars or other drainage features to allow for traffic, clearing vegetation that obstructs visibility and smoothing and grading road surfaces.

Road construction – building new road.

Temporary road – a low standard road constructed for a single entry with a minimum of disturbance and that is waterbarred and closed following use.

Seep – Woodland seeps are small areas, usually less than ¼ acre, on headwater slopes where groundwater flows to the surface and saturates the soil for some or all of the growing season. Drainage from these areas may create small streams or may return underground (Flatebo, et al. 1999).

Silviculture - A combination of actions whereby Forests are tended, harvested, and replaced.

Stand (Forest) - A community of naturally or artificially established trees of any age sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity. A Hardwood Stand is defined as a stand which at least 75 percent of the overstory and understory are hardwood trees. A Softwood Stand is defined as a stand which at least 65 percent of the overstory and understory is softwood (conifer) trees. A Mixed wood Stand is defined as a stand with hardwoods trees mixed with softwoods trees. The 25 to 65 percent of this stand consists of red spruce, balsam fir, and eastern hemlock.

Streams - Non-perennial and perennial are two types of stream that the quantity of water can be measured.

Intermittent Streams - Streams with a defined channel that the quantity of flowing water can be measured except during the dry summer months.

Perennial Streams - Streams with a defined channel that the quantity of flowing water can be measured year round.

Uneven-aged management - The application of a combination of actions needed to maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Harvesting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Harvest methods that develop and maintain uneven-aged stands are individual selection, improvement, and group selection, and salvage.

Individual Tree Selection - A method where individual trees are selected and harvested in a stand while maintaining a prescribed number of trees in each diameter class ("Q" Factor).

Improvement Cut - An interim step to developing an uneven-aged stand structure by removing lower quality stems, leaving a residual basal area of about 65-70 sq.ft. (hardwood) or 80 to 100 sq.ft. (mixed wood) per acre.

Group Selection - A harvest method that describes the silvicultural system in which trees are removed periodically in small groups, resulting in openings that do not exceed an acre or two in size. This leads to the formation of an uneven-aged stand, in the form of a mosaic of age-class groups in the same forest stand.

Overstory Removal – Mature trees are removed to release regeneration once it has become established, for example in a shelterwood final harvest.

Vernal Pool – Naturally occurring seasonal, semi-permanent, or permanent bodies of water, free of predatory fish populations, that provide breeding habitat for certain amphibians and invertebrates (Carlson and Sweeney 1999).

Visual Quality Objectives - A desired level of scenic quality. Refers to the acceptable degree of alteration of the characteristic landscape:

Preservation - A visual quality objective that provides for ecological change only.

Retention - A visual quality objective that means that management activities are not evident to the casual Forest Visitor.

Partial Retention - A visual quality objective that means that management activities may be evident but must remain subordinate to the characteristic landscape.

Modification - A visual quality objective that means that management activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture.

Volume - The measure of quantity forest products (sawtimber, pulpwood, and chipwood).

Board Foot - A measure of lumber volume for sawtimber. The cubic equivalent of a piece of lumber 12 inches wide, 12 inches long, and 1 inch thick. MBF is the measure for 1000 board feet.

Cord - A measure of volume for pulpwood and millwood. One cord equals one stack of wood measuring 4 by 4 by 8 feet or the equivalent of 500 board feet.

Ton - A measure of volume for chipwood